# COAL AGE

A McGRAW-HILL PUBLICATION

With which is consolidated "The Colliery Engineer" and "Mines and Minerals"
Published by McGraw-Hill Publishing Company, Inc.
H. W. CLARKE, Vice-President

## MAY 1939




## CONTENTS

Volume 44    No. 5



●**Did you** miss it—the roll call of advances in mining practice and equipment at the April Mining Congress convention-exposition? If you did, or if you were there and want to refresh your memory of the new developments, look for the Coal Age convention-in-print number in June, where the proceedings and show are boiled down for him who reads as he runs.

● **Coal mining** and power are inseparable in these days of expanding mechanization of mining and preparation. Glen Alden, for example, prepared for the opening of its new Huber breaker by building a new power plant designed for a 600-lb. boiler pressure and a 632-deg.-F. steam temperature. R. Dawson Hall, who told the story of the breaker in April, discusses the significance of this advance in the article on p. 37.

● **No coal-producing** area has a monopoly on advances in mining and preparation. Witness Utah, where the U. S. Fuel Co. has consolidated two mines into one, purchased new equipment for 100-per-cent-mechanized mining and installed a complete washing, screening, heat-drying and blending system. Ivan Given tells the story of the underground modernization on p. 29; a description of the preparation plant follows next month.

● **Rivers** bear an increasing percentage of the country's coal production to market and consequently the number of modern barge-loading terminals is growing. United Electric's terminal on the Illinois River, reached by 7½ miles of company-owned railroad, is the subject of an article in this issue, p. 39. Coming up is a description of another brand-new plant, this time in the Appalachian region.

● **Coal** research might be likened to the weather as characterized by Mark Twain: everybody talks about it but only a few—speaking of the coal-producing fraternity—try to do anything about it. This in spite of the fact that research really pays, as even the casual reader can glean from Ralph A. Sherman's article on Battelle, scheduled for June publication—first of a series on research developments.

● **To limit** or not to limit? That is the question on which electrical men split when demand is on the carpet. One of the latest recruits to the limiting group is the C.C.B. Division of the Koppers Coal Co., which got back the cost of the necessary equipment the first month it was in operation. The details will be included in an article scheduled for June.

Stokers feed boilers in the Huber power plant; see p. 37


COAL AGE is published monthly on the 1st. $3 per year in the United States, Canada, Mexico, Central and South American; other countries, $5 or 20 shillings. Single copies, 35 cents each. Entered as second-class matter Oct. 14, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U.S.A. Cable address: "McGrawhill, N. Y." Member A.B.P. Member A.B.C.





**McGRAW-HILL PUBLISHING COMPANY, INC.**
JAMES H. McGRAW, Founder and Honorary Chairman
**Publication Office, 99-129 North Broadway, Albany, N. Y.**
**Editorial and Executive Offices, 330 West 42d St., New York, N. Y.**

JAMES H. McGRAW, JR., President    HOWARD EHRLICH, Executive Vice-President    MASON BRITTON, Vice-Chairman
B. R. PUTNAM, Treasurer    D. C. McGRAW, Secretary    J. E. BLACKBURN, JR., Circulation Manager

Branch Offices: 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, Aldwych, London, WC 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

# COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

MAY, 1939


◆

## Pertinent and Impertinent

• How OFTEN the record runs: "After the accident we did thus and so." How much better if it could be stated: "Before an accident occurred, provision was made to prevent it." Good engineering and good safety lie not so much in corrective work as in prevention. If the correction can be made after an accident, it could be made equally well before. "No one would have thought of the possibility of such an accident," is the usual evasion, but it is scarcely an effective response. Some proceed only on repeated experience; others on a single event, with or without casualty. But some have a mentality that will envision the accident merely by the exercise of study.

• A THOROUGH public-relations job is evidently as necessary for our English coal-producing cousins as for ourselves, if we may read between the lines of a *Colliery Engineering* review of a booklet entitled "One Hundred Questions and Answers About Coal." Prepared in cooperation with the Mining Association of Great Britain, the booklet is primary propaganda for the man in the street. "Few industries," states the review, "have been more in the public eye than the coal industry and few have been so persistently misunderstood." Coal, it emphasizes, "has long been the butt of the amateur politician, whose vociferousness has usually only been equaled by his ignorance of the subject." By and large, we opine, coal has the same long, lone, hard fight against generally adverse popular opinion across the pond as we have here. It's high time additional coordinated effort is expended to "sell" it to the general—and particularly to the consuming—public.

• REAL PROGRESS was made during the first fortnight of the Appalachian wage negotiations at New York. Then, after agreeing to a two-year renewal of the 1937-39 wage and hour provisions, both sides talked themselves out on opposite limbs of a shaky tree on the twin issues of the closed shop and penalty clauses. As these mid-April lines are written, the question has become how the embattled conferees can shimmy down without skinning their faces or breaking their resolutions. Mayor LaGuardia offered his services and then appealed to the President, who preferred a watchful-waiting policy until the Department of Labor had exhausted its resources of conciliation. And the suspension hits the front page.

• INDUSTRY'S FIRST JOB, said Robert L. Lund, executive vice-president, Lambert Pharmacal Co., at a McGraw-Hill Public-Relations Forum in Chicago last month, is to know itself. "No orderly or intelligent business policy is possible without this understanding. Then follows the obligation to impart this information in understandable form to the public; not to the public as an indiscriminate mass but to all the elements which make it up; adapting the method and procedure to the need of each, so that all may know the things upon which a sound public opinion can be built."

• "COAL IS COAL," says the realist with discouraging finality. But is it? Not if the dictum means that coal is just fuel. Not

when, as pointed out by Prof. Turner of Penn State, there are more than a score of non-fuel uses for anthracite alone. His list includes reduction and sintering of ores, battery plates, flashlight batteries, paint pigments, acid-resisting vats, paper-mill digester blocks, explosives and carbon brushes. Introduced as a filtration agent in 1935, anthracite fines are now used for that purpose in 38 States and five foreign countries. Just a passing sidelight on what research can do to create new markets for coal.

## Asset or Liability?

MOST ANNUAL REPORTS of business institutions are dull reading to all but the financial specialist and a limited group of stockholders. And yet, as an increasing number of companies are discovering, these drab pamphlets can be transformed into a real asset in promoting public relations. Conventional graphs, Vienna charts and even cartoons now lighten the pages once sacred to prosaic recital, small-type auditors' certificates and batalions of financial statistics. More and more, progressive management is discarding mossy tradition in a determined effort to make these annual reports both interesting and informative to its own organization and to the general public.

One of the latest examples of this growing trend is the annual report of the Pittsburgh Coal Co. for 1938. Production, competitive energy consumption and company tax payments are pictured in graphs. The formal consolidated income and expense and balance sheets are supplemented with illustrated simplified statements. Copies of these simplified statements, accompanied by a two-page letter over the signature of the chairman of the board explaining in more detail the effect of current economic and legislative conditions on employment and wage earnings, were sent to each mine worker on the payroll. The coal industry—any industry—can stand more public-relations work of this character.

## S.O.S.

A CAMPAIGN to breathe new life into Bituminous Coal Research, Inc.—now moribund as far as laboratory work goes—has been started. Meeting at Pittsburgh a few weeks ago, the research committee of the organization outlined a three-year six-point technical program. The techincal objectives are desirable and important; the financial goal set is extremely modest. Producers and allied interests are asked to contribute only $235,000 per year to make the dream program a reality.

In view of what intelligent research has done and is doing for competing industries, such a sum should be raised without difficulty. In view of the pressing necessity for continuance and expansion of research in the coal industry, the sum ought to be vastly increased. Whether they are willing to admit it or not, the response that men in the coal-mining industry give to this appeal will be a real index to their vision and to their faith in the future of their own calling.

## Under Cover?

STRIP MINING is out in the open. The same thing, however, cannot be said of some of the propaganda aimed at curtailing strip-pit activities. This propaganda usually takes one of two forms and sometimes both: stripping ruins good farming lands and robs labor of employment opportunities. A lengthly set of resolutions said to be up for consideration by shaft and slope miners of both unions in Illinois gives an added fillip by charging strip operators with a plot to scuttle the Guffey act.

The attack from the standpoint of employment is on all fours with the fight certain misguided interests have been waging both under cover and in the open against deep-mine mechanization. Indeed, the present set of resolutions, apparently originating at Lenzburg, Ill., would have the government prohibit all use of machinery in mining, "with the usual exception of such minor mechanisms as are used for the exclusive purpose of safeguarding life and limb of those employed." Back to the primitive days when coal was carried out of the mine in baskets!

To the informed, the absurdity of such contentions is their own answer. And with Uncle Sam paying bounties for ploughed-under acres, the picture of agricultural-land scarcity also has its ridiculous side. Moreover, as has been shown in a recent report of the United States Bureau of Mines, progressive operators, independently and in cooperation with State authorities, have done much to reclaim stripped-over areas for agricultural and recreational uses. More such work should be done, and still more should be done to publicize the truth. Unless strip operators take the offensive, they may find themselves threatened, as in Iowa and other States, with increasing pressure to legislate them out of business.

## You Can't Beat It

THAT INCREASING CONSUMPTION invariably follows lowered production and sales costs of a necessary commodity has been demonstrated by industry after industry. Coal men in distressingly large numbers, however, still cling to the idea that they can go contrary to this broad concept in the face of intensive competition. And this despite the fact that the economies of mechanization have been sufficiently proved over so wide a geographical front that the general adaptability of many mechanisms for lowering costs no longer can be questioned.

Low-cost coal will inevitably increase consumption by regaining and retaining markets now lost through high prices. It will recreate job opportunity and stability. Concurrently high wages can be maintained and annual earnings augmented with rising tonnage volume and increased running time per year. Low-cost and large-volume production also will blot out red ink and restore profit margins. The day has come to apply plain, simple economics to the problems of the coal industry.

# ONE PLANT REPLACES TWO

## + In Modernizing Mining and Preparation At U. S. Fuel's Utah Properties

CONSOLIDATION of operations to make it possible to prepare its entire output in one plant embodying the latest methods of mechanically cleaning, screening, drying, blending and treating coal at a rate of 2,100 tons per shift when market conditions will support such an output is a major feature of a modernization program at the mines of the United States Fuel Co., in Carbon and Emery counties, Utah. In the course of this program, started in 1938, the company also changed from part-hand-part-mechanical to 100-per-cent mechanical loading, including the replacement of old loading machines with new and larger units.

A two-shift operating schedule for both the mine and preparation plant was adopted and enough new cutting machines were purchased to equip the consolidated operation completely with track-mounted equipment. Old 3-ton cars were replaced with 5-ton units and enough new batteries were purchased to equip sufficient additional locomotives to give each loading machine two.

**•** "Streamlining" is a much overworked word these days, but is so aptly descriptive of the modernization program of the United States Fuel Co. in Utah that no less colorful synonym seems appropriate. All hand loading has been eliminated; output from two active mines, as well as from territory allocated to operations which have been down for several years, now comes out of one opening and goes to a new mechanical cleaning plant replacing two older preparation units. The historical background, major objectives of the modernization program and the story of that program as applied to underground working are told in this article; the new preparation plant and its operation will be described in the June issue of Coal Age.

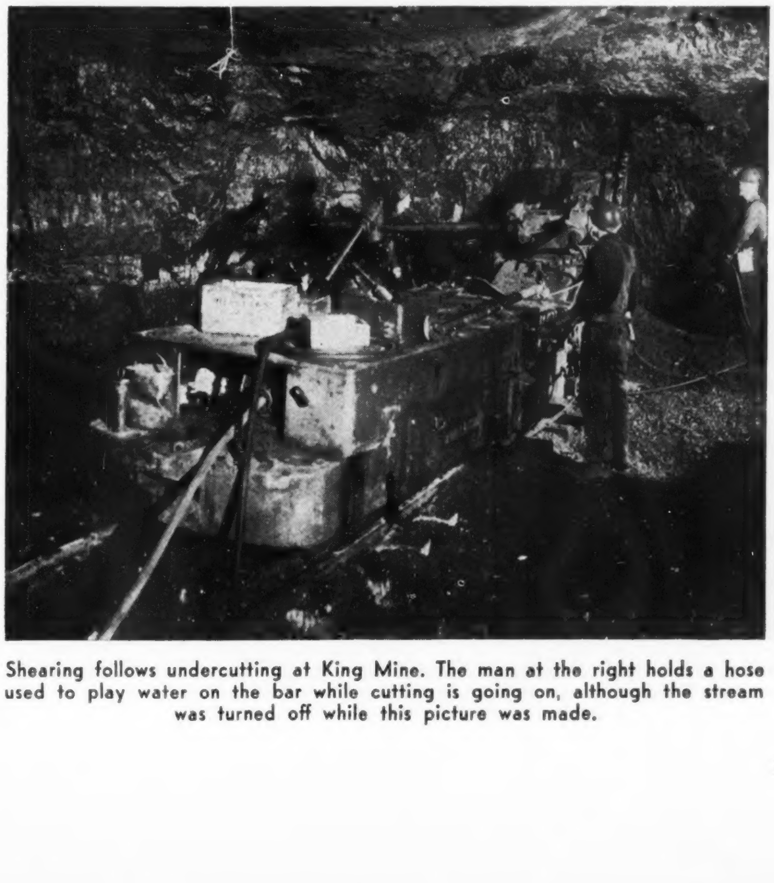
By IVAN A. GIVEN
*Associate Editor, Coal Age*

### One Mine Instead of Two

Prior to the change-over, the United States Fuel Co. operated King No. 1 mine, at Hiawatha, and King No. 2, at Mohrland. Each mine had its own preparation plant and was rated at 2,100 tons per day, one working shift. For some six to eight years prior to the consolidation, approximately 60 to 65 per cent of the output had been loaded mechanically, with the remainder representing largely hand-mining of pillars.

As a result of the consolidation, all the coal from the above operations plus that from the territories allocated to the old West Hiawatha mines, inactive for several years but now merged with No. 1, will come out of the King No. 1 opening. The combined workings now bear the designation King Mine and all mining, transportation and other activities have been geared to the preparation-plant capacity.

Coal was shipped by wagon from local mines where the company now operates as far back as 1905 or earlier. The first commercial mines were opened around 1909 or 1910, and on March 25, 1915, the United



Shearing follows undercutting at King Mine. The man at the right holds a hose used to play water on the bar while cutting is going on, although the stream was turned off while this picture was made.

States Fuel Co. was organized to take over the holdings of the Consolidated Fuel Co., Black Hawk Coal Co., Panther Coal Co. (mine worked out) and Castle Valley Coal Co. Present operations are conducted under the direction of J. D. Harlan, general manager, with a mine staff as follows: general superintendent, W. N. Wetzel; mining engineer, H. B. Lindeman; mine foremen, J. W. Littlejohn and Mel Sherfick; general master mechanic, F. E. Gleason; shift mechanics, Joe Parmley and Hugh Utterback; and preparation supervisors, Emil B. Keenan, engineer, assisted by a coal inspector and Dan Garber and Neils Christensen, shift foremen.

The portal of King No. 1 is some 650 ft. above the level of the trestle to the preparation plant, built at the foot of the mountain. The connection between mine and preparation plant is a 7,500-ft.-long double-tracked incline, on which the grade runs up to 20 per cent in places. Four to five trips of fifteen cars (coal, 75 tons; cars, 32 tons) an hour are handled in balance by a Vulcan of Wilkes-Barre incline machine. This incline machine, one of the first for regenerative lowering ever installed in the United States, went into service in 1918. It is equipped with a 500-hp. Type MT 2,200-volt General Electric induction motor. Roebling 1⅝-in. regular-lay plow-steel rope is now in service on the incline, which was fitted with manganese-steel Hyatt-roller-bearing track rollers. These rollers are built up with manganese rod and turned down when worn. Some, rebuilt as necessary and with bearing replacements when required, have been in service for twenty years. In addition to the incline machine, a small single-drum hoist is installed for handling men and materials on idle days or at other times when regular trips are not run.

The United States Fuel Co. is engaged in the recovery of the Hiawatha seam, ranging in thickness from 6 to 24 ft. and averaging 18 ft. The coal, bituminous in rank, is without butt or face cleats and is relatively hard. Consequently, hard cutting and heavy shooting is the rule. General dip of the seam is 2 per cent to the south and, with the greater part of the reserves lying to the south of the King No. 1 portal, most of the main haulage is up the dip. The bottom is a very hard shale, while the seam is overlaid by sandstone, occasionally displaced by shale lenses. Maximum cover thickness is about 2,500 ft.

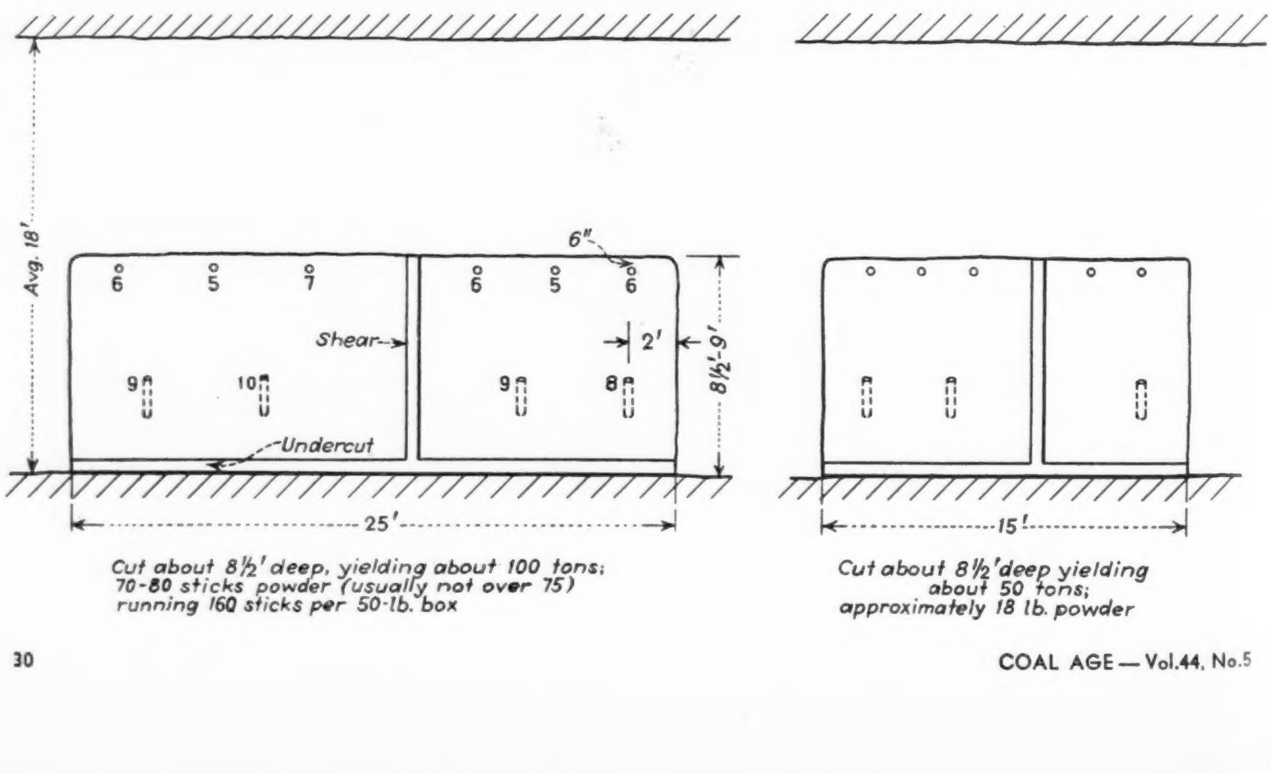
## Boney Material Troublesome

The seam is characterized by one persistent shale parting about 8½ ft. above the floor in coal of average thickness. Thickness of the parting ranges from ¼ in. up to 3 to 5 ft. No other regular impurity is present in the coal, although boney material is encountered in varying quantities and offers, along with flat carbonaceous shale, perhaps the most difficult mechanical-cleaning problem in that it has a specific gravity only slightly higher than the washing gravity. Consequently, provisions for crushing and re-treating part of the washer reject are included in the new preparation plant, which will be described in an article in the next issue of *Coal Age*.

From the standpoint of coal quality and mechanical-mining efficiency, the parting offers the greatest difficulty and was the major reason for the adoption of mechanical cleaning. Attempts to eliminate the parting in the mine naturally handicapped loading-machine operation; if left in the coal as loaded it tended to concentrate in the smaller sizes, from which it was difficult or impossible to remove by hand-picking. And where the parting thickened, it often was necessary in the past to skip certain coal areas, although in some instances only the lower bench was mined or the two benches were mined separately. In the latter case, the rooms in the bottom bench were driven under the pillars in the top bench. Another alternative, where the parting was not over 18 in. thick, was to drive openings leaving a foot of top coal under the parting. Track then was withdrawn and the places were remined by shooting down the top coal and parting and re-laying the track on top of it. But, as none of these alternatives was completely satisfactory, it was decided with the change to complete mechanical loading to transfer all coal-cleaning operations to the outside, where proper provisions could be made for efficient removal and thus eliminate the necessity for special measures underground, with attendant loss of time and increase in cost.

Development at the King property is based on driving main entries,

Fig. 1—Usual drilling plans for rooms (left) and headings (right) at King Mine.



raises and levels. Location of main entries usually is adjusted for most convenient access to a block of coal to be worked. Raises off the mains normally are advanced up the pitch. Levels, from which the rooms are worked, normally are turned both directions from the raises and are driven across the dip at a slight angle to provide a grade of about ½ per cent in favor of drainage. Under certain conditions, therefore, the direction of driving levels may be changed if the dip changes and, furthermore, levels may be graded in places to eliminate the use of booster pumps.

All openings—mains, levels and raises—usually consist of two headings about 15 ft. wide and 8½ to 9 ft. high. Sixty-foot pillars are left between headings. In late years, however, three headings frequently are driven to provide additional working places for the loading machines. On mains and raises, the third opening is a regular heading, while on levels, this auxiliary opening is made by lining up the first room crosscuts. Along raises also, the first pair of rooms on each level are driven through as fast as possible to the next level to provide additional openings on both sides, parallel to the raise—primarily for air but also for other uses as necessary. Thickness of the pillar between the raise and the first room is 300 ft. center to center of openings. Along the main entries, barrier-pillar thickness is 150 ft. center to center of openings.

Completing the wiring of nine shotholes in a 25-ft. wide place. After the shift is over, this system will be connected to the main shooting circuit, which is energized from the outside after all the men are out of the mine.

## Retreat Working the Rule

Retreat mining, subject to the variations normally to be expected in conducting a mining operation, is the rule at King mine. By retreat operation is meant that levels in a particular coal block, generally outlined by the mains and raises, are driven and then the rooms and pillars are mined out starting at the inby ends of the levels and working out to the raise. Pillar lines normally are established on an angle of 45 deg., and the lines as they lengthen may extend across two or three level, or room, entries; and finally, in many cases, may take in such raises or mains as are not needed for subsequent work, with their attendant barrier pillars. Once a fall is made, the roof, in spite of its thickness and its composition of primarily sandstones, breaks and caves regularly as the coal is removed. As far as possible, all openings are turned at angles as nearly to 90 deg. as possible, in view of the practice of driving levels at a slight angle to facilitate drainage. The 90-deg. rule also applies to crosscuts, inasmuch as square or rectangular pillars are more desirable under the heavy cover prevailing, as they do not offer as many long points to the crushing action of the overburden.

Normal room width is 25 ft., and rooms are turned up the pitch, as previously stated, at nearly 90 deg. off the raises. Neck width is 15 ft., and all rooms are widened to one side. Usual room depth is 350 ft., which is the distance from one level to the next. Center distances still are in a state of flux, in view of continuing experimental work on the proper length and thickness of pillars for efficient mechanical mining. To date, however, pillars generally are 50 to 60 ft. thick and about 50 to 60 ft. long in new work, inasmuch as room crosscuts, all driven on sights, are made on about 80-ft. centers, as compared to the legal limit of 200 ft. in Utah.

In view of the thickness of the seam, mining operations involve driving up places in solid coal, removal of top coal on the retreat and, finally, recovery of pillars by splitting followed by loading of the top coal and mining of the stumps. As stated, levels generally are driven to the limit, whereupon nine or ten rooms, or enough for a loader territory, are started. These rooms are driven about 9 ft. high and 25 ft. wide up to the next level, making the necessary crosscuts, always to the right, as the rooms advance. The top coal then is shot down in lifts 60 to 70 ft. long, including crosscuts, and loaded. Finally, the pillars, on the basis of the present plan, are mined by driving through them in one direction and taking the top coal, and then driving through in the other direction and again taking the top coal. This leaves four stumps on the corners, which are worked down as far as possible, after which the remainders are shot out, if necessary, to prevent their interfering with regular caving of the roof. Obviously, solid work, top-coal extraction and pillar mining are synchronized to maintain a regular pillar line over the several levels. Where possible, also, operations are arranged so that top coal is available while advancing rooms as a loading reserve in case of trouble in the regular places, thus insuring full output each shift.

Production units, under the present set-up, consist of one Joy 11BU loading machine, one Sullivan 7AU or CLU track-mounted cutter equipped with drill, and two General Electric cable-reel or Edison storage-battery locomotives. Normally, each loading machine is served by two locomotives, although under certain conditions one locomotive will do the job, in which case a cable-reel unit is employed. But where two locomotives are used, the general rule is to employ only battery units, thus eliminating difficulties growing out of cable interference.

All storage-battery units were made by mounting batteries and

Loading machine tackling a fall of top coal in a room. In spite of rather heavy shooting, large lumps are frequent.

trolley poles on existing cable-reel machines, thus making operation off the trolley possible on entries and also permitting charging at the same time. Addition of the batteries brings the nominal rating of the units up from 6 tons to about 8 tons. Locomotive speed when operating off the batteries is about 5 to 6 m.p.h. full loaded; off the trolley, 6.4 m.p.h. at 250 volts.

## Track Laid Up First

With loading completed in a place in advancing a room or heading or other opening in solid coal (exclusive of top-coal recovery), the first task is to lay up the track for the cutting machine. For this purpose, extension rails on steel ties are employed until a long rail can be placed. Back of the extensions, the track is laid on 5x5-in.x5½-ft. native red-pine ties. All new rail is 40-lb. stock. The next operation is timbering, if required—also with native red pine. With track and timber extended, the place is ready for undercutting, shearing and drilling.

Cutting machines are equipped with 9½-ft. bars, using Cincinnati and Bowdil chains and bits. Production per point with these bits is not greatly different from that with the standard bit, but they have a material advantage in that transportation up to four miles to the outside and resharpening—necessary with the standard bit—are eliminated. Water lines are run to all working places and each cutting machine is provided with a hose, which is used to spray the bar at all times while cutting.

After undercutting is completed, the place is sheared as near the center as machine design and natural conditions (curves, etc.) will permit. Upon completion of shearing, the holes are drilled before the machine pulls back from the face. "Coalmaster" conveyor-type augers, heads and bits are employed, and hole diameter is approximately 2 in. Use of the throw-away bits in drilling grows out of much the same reasoning as in the case of throw-away cutter bits. In a room 25 ft. wide and 9 ft. high, making about 100 tons of coal, ten holes usually are drilled about as in Fig. 1, with the top holes level and as near the top as possible.

Depending on conditions, the holes are loaded with 70 to 80 sticks of explosive running about 160 sticks to the 50-lb. box. Adobe stemming is the rule. If conditions are normal, the place is shot with about 70 sticks, distributed about as in Fig. 1. Headings 15 ft. wide and 9 ft. high, making about 50 tons of coal, are shot with about eight holes loaded with 18 lb. of powder. The mine average in solid work is about 3½ tons per pound of explosive, a reflection of hardness of the coal. For the past five or six years, "Hercogel" in 1¼x 8-in. sticks has been used for shooting, due to the fact that wet holes are frequent. Lately, experiments with "Red H F" and "Red H C" have been carried out, and one or the other will be used in connection with the "Hercogel."

Prior to loading the holes, the extension rails are removed to permit the loading machine to work across the face. After the holes are loaded, they are wired up ready for connection to the firing line after the shift is completed. Delay detonators are used to get the proper sequence in the ignition of the charges. As shooting powder while men are in the mine is banned, separate rubber-covered shooting circuits are run to each section. At the end of the working shift, the tamper connects the detonator system in each face to the level shooting circuit and closes the firing switches, one for each face, before coming out. On his way outside, he also closes the firing switch for his level, which is an additional safeguard against premature ignition. When all men are outside, as determined by inspection of the checkboard, the main firing switch on the surface is closed, energizing the circuit with 280 volts. The firing switch then is opened and locked, and the tampers return to inspect their sections, opening the level and room switches as they go in. The places then are ready for loading on the next shift.

In recovering top coal, the practice is first to shoot out a wedge-shaped opening to the roof at the inby end of the place. Thereafter, the coal is shot down in 60- to 70-ft. lifts by rows of holes on about 6-ft. centers (about four holes per row in a 25-ft. place) drilled up at an angle of approximately 30 deg. to within about 6 in. of the top. The regular drilling equipment or Chicago Pneumatic post-mounted drills may be used for this purpose. In top-coal recovery, the yield is about 4 to 4½ tons per pound of explosive, inasmuch as hard shooting also is required here to break up the coal into small enough chunks to be handled by the loading machines and go through the dumping and primary crushing equipment in the preparation plant.

## Changing Switches Kept Close

All working places are laid with a single track in the King mine, with switches for changing tracks laid into each crosscut as the places advance. Normally, two crosscut tracks are maintained in each place when room is available and, as crosscuts are driven usually on 80-ft. centers in new work to date, a storage track holding about four cars is available around not over 125 ft. from the face, with a second track 80 ft. back in the next crosscut.

Transportation is based on 15-car trips. Levels usually are driven to accommodate around twenty rooms, and a parting is installed in the mouth of each level by slabbing the

barrier pillar through which the level is driven. These partings hold fifteen cars and usually are not over 1,500 ft. from the farthest working place. When a main-line locomotive brings in a 15-car empty trip to exchange for a loaded trip, one of the two gathering locomotives, if two are in use, usually is on hand to meet it. This locomotive picks up seven or eight cars and heads them into a room or other working place nearest the place in which loading is going on. When the other locomotive passes on the way to the parting, the first one heads its empty trip into the loader, and as fast as the cars are filled, kicks them into the nearest storage space.

### Load Two Cars at Times

When a loader is starting into a fresh cut, cars are filled one at a time. As soon as the loader clears an aisle to the face and gets off to the side, it usually is possible to run the trip past and load two cars at a time. This is particularly true in loading top coal. While the trip is being filled, the second locomotive has gotten a new supply of cars and is waiting to take the first machine's place. Where only one locomotive is used—usually where the distance to the parting is short—the system is the same, except that, if grades permit, the whole 15-car trip may be headed in at once and half of the cars stored in a near-by place.

Main haulage at King mine is handled by 15-ton General Electric trolley locomotives pulling standard 15-car trips. At present, the transportation schedule is adjusted to deliver four to five trips an hour to the parting at the top of the incline. One locomotive gathers to a central parting inside the mine from the various level partings, which may range in number from three to five, depending on the number of production units in service. From this central station a second locomotive moves the trips to the incline parting. Under this system, passing tracks, block-signal systems, etc., are unnecessary. Where more than one parting is established on a level—which occurs if it is longer than normal—a run-around track is laid in addition to the two parting tracks to permit the main-line locomotive to move in and out freely. All partings, wherever established, are laid out for 15-car trips. Existing partings, including the one serving the incline, were lengthened as necessary to accommodate the longer new cars.

Main-line track construction is based on the use of 60-lb. rail on 6x6-in.x6-ft. native red-pine ties to the mouths of the levels, with 40-lb. rail in all levels and rooms. Main lines, particularly, are graded to keep the inclination against the loads to 2 per cent, the average pitch of the seam, or less. Where grading is required, the usual practice, in view of the coal height, is to fill to get the desired track level. Tracks are ballasted with mine rock. No. 4 frogs of the shrouded, or flange-bearing, type and made at the mine are used everywhere except for room and crosscut turnouts, which are laid with Bethlehem No. 2½ cast-manganese-steel frogs.

To increase loading-machine output, the United States Fuel Co. replaced its old steel cars, having a capacity of 3 tons each, with new steel cars capable of holding 5 tons mechanically loaded. The new cars consist of Watt bodies on Card-Timken trucks off the old units. Link-and-pin couplings (cast-steel links, safety hooks on the pins) were installed, along with safety chains and band brakes on all four wheels. Copper-bearing sheets were used in the bodies, which are partly welded and partly riveted. With a level-full capacity of 170 cu.ft., the new cars are 148 in. long over the bumpers, 131 in. long and 66 in. wide inside, and 49⅛ in. high over the rails (18-in. wheels). Weight per car is 4,300 lb. compared with 3,600 lb. for the old cars.

Direct current for the operation of underground equipment is supplied by three Hawthorn synchronous m.g. sets. Two sets (200- and 350-kw.) are installed at the old King No. 1 portal, while a third 350-kw. set is two miles back in the mine in a special concrete substation. This latter set is supplied with 2,200-volt a.c. by means of a lead-covered cable buried in a trench in an escapeway. Both rails of all main-line, raise and level tracks are bonded, even including level tracks in sections where battery locomotives are used. In addition to the regular trolley-and-track circuits, separate circuits (4/0 or 6/0 hot line and a return of the same size) are carried for loading and cutting machines. The standard is 280 volts at the face, which is maintained by regular checks in addition to reports from operators as to their opinion of voltage conditions as reflected in the way their machines operate.

Regular rock-dusting to keep the ash content of the dust in openings at at least 70 per cent is the practice at King mine, where other safety measures include the use of Edison electric cap lamps, M-S-A "Skullgards," American Optical goggles and safety shoes. To facilitate the repair of underground equipment a shop has been constructed at the King No. 1 portal. The shop is for repair and assembly only, as all heavy work (complete overhauling, heavy lathe work, building up and turning locomotive wheels, etc.) will be done, as in the past, in the main shop at the foot of the incline.

350-amp. combination battery-and-trolley locomotive serving a loading machine in a room neck. Gathering locomotives normally handle trips of seven or eight of the new 5-ton steel cars.

# STEEL ROOF SUPPORTS

## + Cut Timbering Costs

## At Nemacolin and Dehue Mines

**• Replacing wood timber sets along haulage roads with walls and columns of concrete or brick is an expensive operation, but the life of the entry determines the ultimate economy of the procedure. To cut costs of this necessary long-time roof support, engineers and operators of the Buckeye Coal Co. have cooperated in experimental designs and erection of steel pipe and beams, which now result in 20 to 25 per cent savings per foot of entry over the former brickwork methods used at Nemacolin and Dehue mines.**

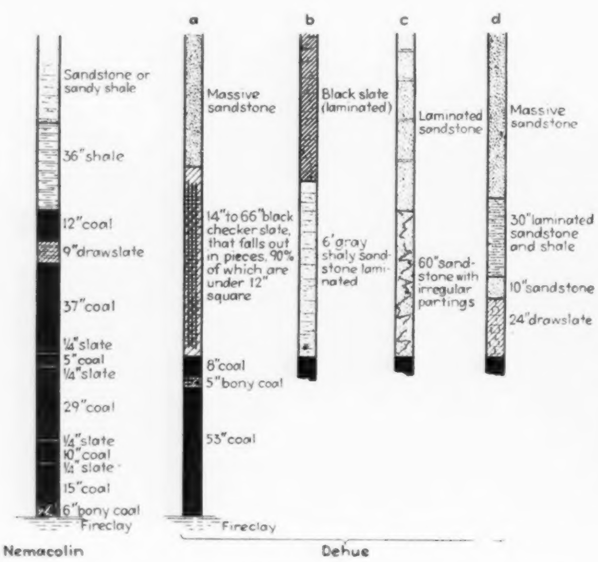
**By A. W. HESSE**
*Chief Engineer*
*Buckeye Coal Co.*

BECAUSE the problem of roof supports is one of utmost importance, the Nemacolin and Dehue mines of the Buckeye Coal Co. and the Youngstown Mines Corporation, respectively, have experimented for years with various types of supporting materials. The Youngstown Sheet & Tube Co., owner of these mines, has had its engineers work in full cooperation with the Buckeye Coal Co. engineers and operators in developing these new types of roof supports. To understand fully the formations with which it has been necessary for us to contend in developing roof supports, cross-sections through the coal seams are shown in Figs. 1 and 2.

Because roof coal (12 in. thick) is left up, and no undue pressures are encountered in Nemacolin mine, it is not a difficult matter to sustain the overlying drawslate, "rooster coal" and shaly slate; but, once the roof coal gives way, it is a problem to hold up the drawslate, coal and shaly slate. These usually fall to a depth of 5 or 6 ft. before coherent rock is uncovered. The type of roof support to be used is not determined until a decision is made, at the site, about pulling down the 5 or 6 ft. of roof which lies above the coal bed.

Wood posts with wood caps have been a common means of holding roofs in place. Also two wooden legs or columns supporting a crossbar spanning the entry have been used to permit a passageway and give security from roof falls (see Fig. 3). On entries which must remain open for many years, decay of timber and continuous repairs make these methods uneconomical. Timber impregnated with creosote, chromated zinc chloride, Wolman salts, etc., by means of pressure processes has helped considerably to remove objections to the use of wood. There remains, however, the question of cutting off the ends or cutting into the timber, exposing the untreated portions to the ravages of fungi, dry rot and decay.

Along haulage roads, the possibility of derailments or wrecks knock-




Figs. 1 and 2—Seam cross-sections, Nemacolin and Dehue.

Fig. 3—Wood timbers set.

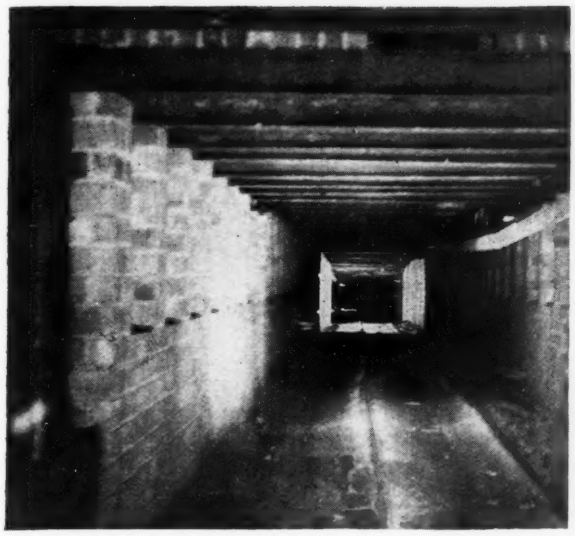
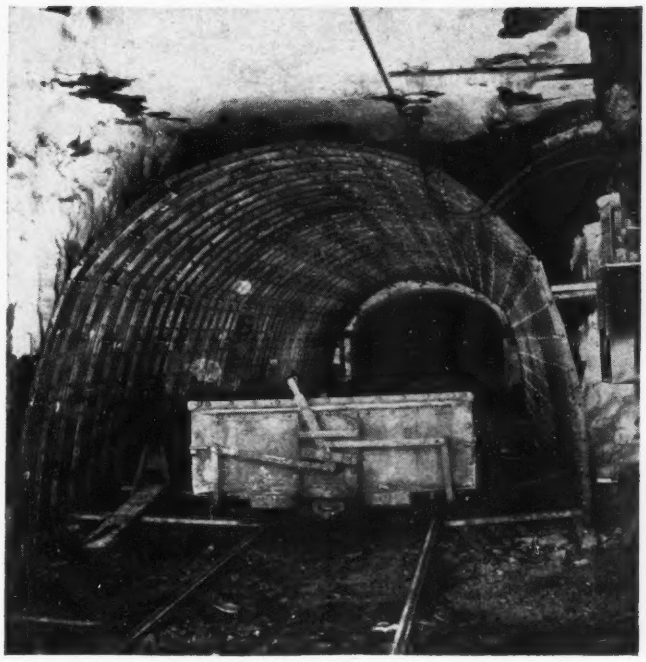


Fig. 4 (above)—Nemacolin mine: roof supports, showing brick and pipe columns built for comparing costs—looking outby from south loaded track.

Fig. 5 (right)—Steel arch roof supports, south empty road.



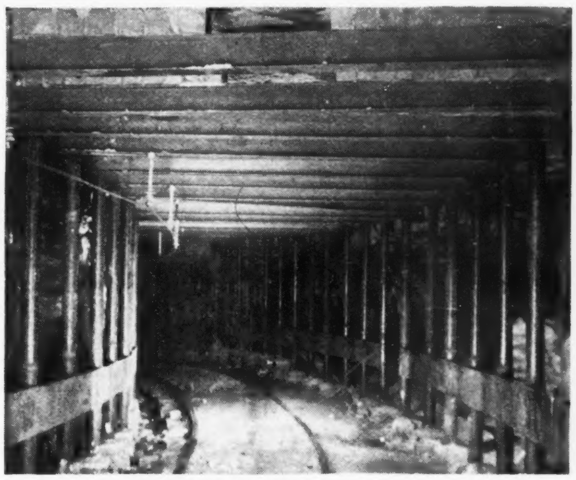
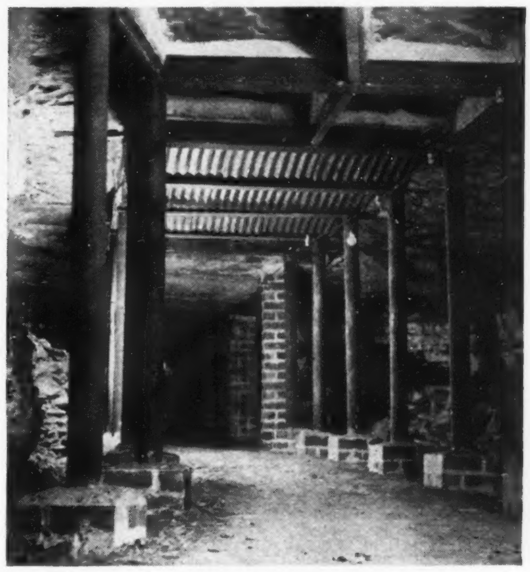


Fig. 6 (above) — Nemacolin mine: steel roof supports, loaded crossover; looking inby from south loaded track.

Fig. 7 (below)—Dehue mine: manway from No. 1 slope bottom to shaft bottom.



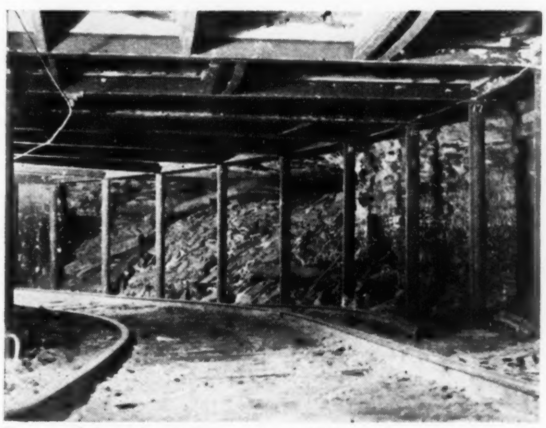
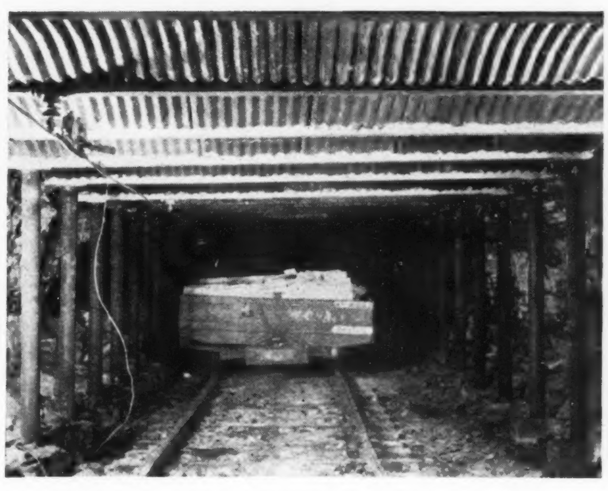


Fig. 8 (above)—Dehue mine: No. 1 slope bottom at curve to Road No. 2 haulage.

Fig. 9 (right)—Dehue mine: No. 1 slope bottom at point inby manway to shaft bottom; corrugated arching between beams.



ing out timbers and letting the roof fall must be borne in mind; therefore, fenders from timber set to timber set are advisable. Scars on concrete and brick walls in the mines, particularly at intersections, bear evidence that fenders have more than paid for their installation.

Building walls and columns of concrete or brick for roof supports is an expensive procedure, but the life of the entry has much to do with the selection of the material to be used. Certain haulage roads in the Nemacolin and Dehue mines will have lives of more than 40 years and the reduction or elimination of maintenance is essential both for safety of transportation and economy of production.

One of the methods attempted in an effort to assure long-time roof support employed steel beams, supported by brick columns, with single brick curtain walls between the columns to the height of the mine car, constructed to serve as fenders (see Fig. 6). The costs of this type of construction have not varied much from $17 per running foot of entry. This cost covers all materials and labor required for the installation, including taking down and loading out the slate.

Steel sheets made up in sections (as shown in Fig. 5) also were tried. This method has proved to be a very satisfactory means of supporting roofs, but too wide an entry is required to give clearance at the trolley height. The necessary width of entry discouraged this type of installation, as the material in 1927 cost about $12 per foot of entry. The excavation, and particularly the packing, to close off possible gas accumulations ran this cost up to the brickwork and beam figures.

When the proposal was made to use steel pipe to support "I" beams, the first comparison made was that of the pipe size required to at least equal that of the wooden posts doing the duty under other methods. At Nemacolin, because of the varying passage heights, it was necessary at times to telescope and weld the pipe and to make the weld as strong as the pipe itself. In order to develop this feature, sections of 3- and 4-in. pipe were telescoped and welded. Tests made in a wheel press on the welded sections clearly indicated a single bead weld made a joint as strong as the pipe itself.

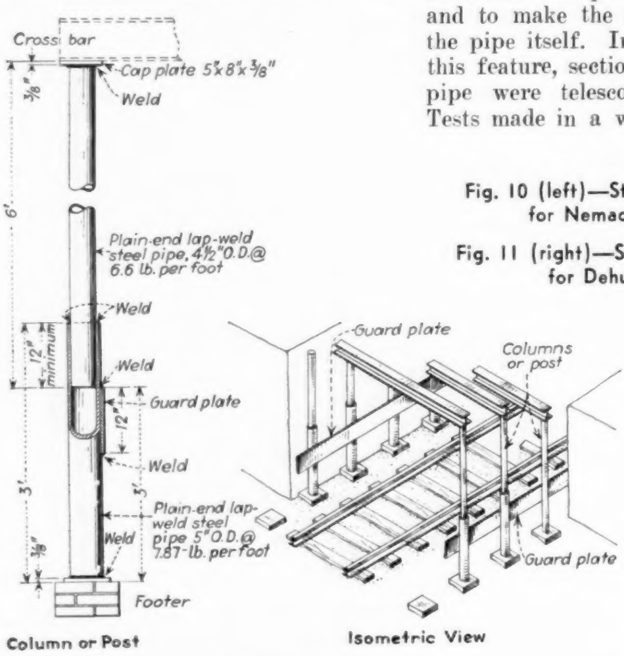
Discussions with Youngstown Sheet & Tube Co. engineers led to a determination of pipe sizes required and which are shown in the specifications accompanying Figs. 10 and 11. Fig. 6 shows results of installation made at Nemacolin and Figs. 7, 8 and 9 show work performed in Dehue.

To secure definite information pertaining to cost of the pipe-type installation, we selected a length of entry having very much the same height and general conditions as those used for other types of installations. To this entry was assigned 182 ft. of length for brick columns and steel beams and 252 ft. for steel pipe supports and steel beams. Costs were accurately kept on both jobs with results as follows:

| | | | | *Per Foot of Entry* | | |
|---|---|---|---|---|---|---|
| | *Material* | *Labor* | *Total* | *Material* | *Labor* | *Total* |
| 182 ft. brickwork and beams | $980.31 | $1,349.57 | $2,330.38 | $5.39 | $7.41 | $12.80 |
| 252 ft. steel pipe and beams | 1,043.86 | 1,428.07 | 2,471.93 | 4.14 | 5.67 | 9.81 |

With the exception of attaching the plate on the bottom of the larger size short (bottom) length of pipe, all other welding was done underground at the location.

The results of this installation were so encouraging that we are now installing the same type at Nemacolin in 800 ft. of manway to the loading station for man-trips. Plans were immediately made to secure the roof in the same manner at Dehue, in entries traveled by our employees, with the results which are shown in Figs. 7, 8 and 9.




**SPECIFICATIONS**

**FOOTINGS**—Before erecting the columns or posts a brick or concrete footing should be placed, the top of the footing to be level with the base of rail.

**COLUMNS OR POSTS**—Use plain-end lap-weld steel pipe of 4½ in. o.d., 6.60 lb. per foot, for the 6-ft. length. When necessary for additional height use lap weld of 5 in. o.d., plain ends, 7.87 lb. per foot, for the 3-ft. length.

**WELDING PIPE**—After length of post has been determined and it is necessary to use a post over 7 ft. long, telescope the pipe to the required length, use No. 16 gage shims to eliminate side movement or "wabbling" and weld continuously around pipe. Pipes should not be extended to attain a height of over 8 ft., as the minimum insertion or telescoping of the pipes should not be less than 12 in. In case a 6-ft. post is used, the larger diameter pipe will not be used.

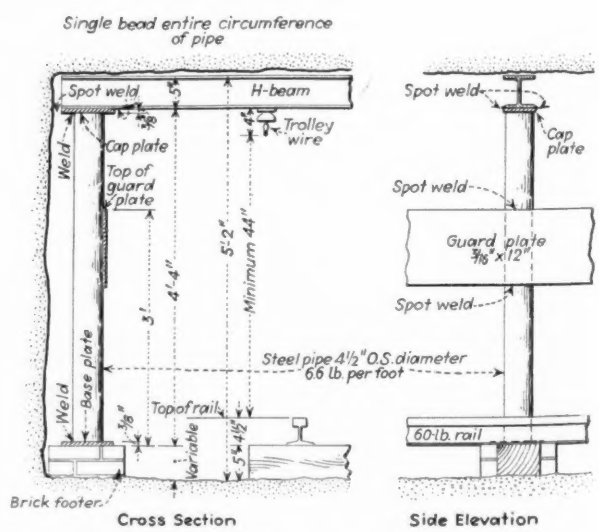
**CAP PLATES**—Use 5x8x⅜-in. plain steel cut to proper size and welded to end of 6-ft. length pipe. Cap to be turned to secure the maximum bearing for a 5- to 6- or 8-in. beam. The cap may be welded on in the shop or field.

**BASEPLATES**—Use 8x8x⅜-in. plain steel cut to proper size and welded to the bottom of the columns or posts when the length has been determined. In case a 6-ft. post is used, the baseplate will be welded to the 6-ft. length of pipe and the larger diameter section will not be used. For posts over 6 ft. long, the baseplates will be welded to the section.

**GUARD PLATE**—Use 3/16x12-in. plain steel. After the posts are in place, a deflecting or guard plate will be placed. The top of the plate to be 3 ft. above the base of rail. The plate to be spot-welded at top and bottom to the posts. The purpose of this plate is to prevent derailed cars from displacing posts.

**Fig. 10 (left)—Steel roof supports for Nemacolin mine.**

**Fig. 11 (right)—Steel roof supports for Dehue mine.**




*Note:- **Cap plate** - 5"x8"x3/8" plain steel, welded to end of pipe.*
***Base plate** - 8"x8"x3/8" plain steel, welded to end of pipe.*
***Guard plate** - 3/16"x12" plain steel; after posts are in place, a deflecting or guard plate will be placed as shown; the purpose of this plate is to prevent derailed cars in moving trains from displacing posts.*

# HUBER POWER HOUSE

## + Establishes New Standards In Colliery Steam Raising

By R. DAWSON HALL
*Engineering Editor, Coal Age*

FOLLOWING its well-defined policy of not only keeping all of its operations completely modernized but also providing against any possible emergencies that might prevent supplying their patrons with a continuous supply of the highest quality product, Glen Alden Coal Co. is blazing away into steam pressures and temperatures hitherto unknown in coal-mine boiler practice. In preparation for the opening of its new 1,000-ton-per-hour-capacity Huber colliery, which began active operation this year (see *Coal Age,* April, 1939), Glen Alden constructed the Huber power house under the supervision of Edward Griffith, vice-president and general manager.

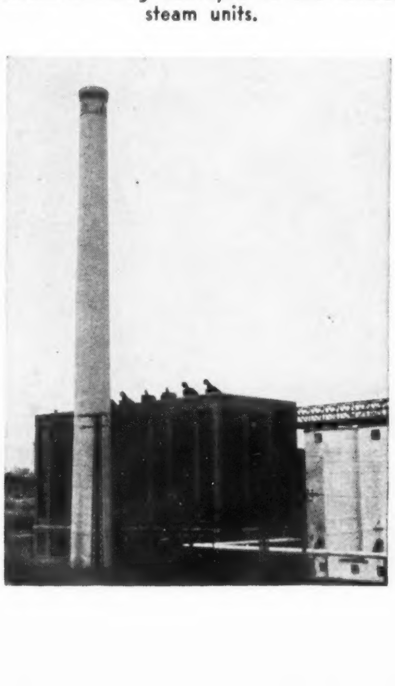
This plant has been in operation since 1937, but with the Huber colliery in operation and with the additional coal that is coming from the Buttonwood mines, in Hanover Township, Luzerne County, Pa., it will be necessary to use the full facilities of this station, which will provide pressures of 600 lb. per square inch and a steam temperature of 632 deg. F., thus far unknown in coal-mine boiler plants. There is also under construction as part of this ultra-modern power-house development a 7,500-kw. turbo-generator.

Two air compressors, each delivering 3,000 cu.ft. per minute, will be moved to the new power house. Foundations for all these machines are already completed. The plant will not only supply power for the operation of the breaker but will provide additional capacity for the company's interconnected plants. This addition will make it unnecessary to truck coal from the Huber breaker to the Nanticoke power house, as was done when the Maxwell breaker, the forerunner of the Huber unit, was in operation. The coal used runs from 3/32 to 1/32 in.

The entire power house is set on the top of the ground, which here is rock and not, as in the celebrated Wyoming Buried Valley near by, a treacherous sand and gravel. Hence the ashes from the boilers fall into cars on a surface track; and pumps and fans, instead of being in a pit, also are located at surface level. The turbo-alternator will rest on a high foundation, level with the second floor.

Four Stirling boilers, each with a capacity of 40,000 lb. per hour with 547 tubes of 3¼-in. diameter and two steam drums of 42-in. diameter and one of 36 in, with one mud drum of 48-in. diameter, supply the necessary steam. They are fired by Coxe traveling-grate stokers, 17 ft. 10 in. long and 12 ft. wide, equipped with combustion control and boiler meters. Recording chart readings are so arranged that best operating results are attained if the indications of air and steam flow shown by the meters are kept close together. When the air-flow indication is above that of the steam flow, there is too much air or too little fuel. With the indications reversed, there is not enough air or overmuch fuel.

Huber power station still under construction, with its 210-ft. stack, the bridge in front by which barley coal is brought to the coal hoist, the three silos in which the coal is drained and the pipes by which steam is being conveyed to the several steam units.



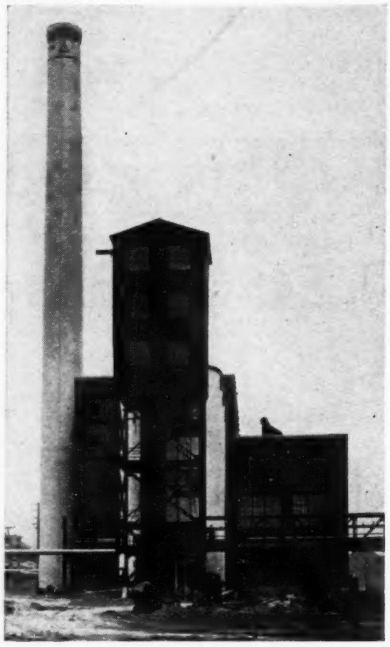
For superheat, 43 elements of 2-in. tubes are provided, giving 855 sq.ft. of surface in each boiler. Combustion space in each unit is 2,430 cu.ft. Water walls have a surface area of 132 sq.ft. and are composed of studded tubes faced with a refractory material. Each boiler has a suspended front wall and a suspended sidewall above the water wall. In connecting the stack to each boiler a main flue is provided, so designed as to prevent stress from expansion or contraction. Turbo-conoidal fans, one for each boiler, supply air for the furnaces. The stack is of reinforced concrete 11 ft. in diameter and 210 ft. high. The bunker over the boilers holds 570 tons of coal. All steam and feed-water high-pressure piping is welded except at the valves, as are all boiler drums.

Water is obtained from the Spring Brook Water Co., but requires careful treatment to prevent scaling, as always is necessary where boilers are operated at high temperatures. A zeolite treatment is provided, sup-

plemented by phosphate and deaeration. The feed-water heater is of the deaerating type.

Buckwheat No. 4 sometimes containing as much as 22 per cent of water is brought by a chain scraper from the breaker to a hoist tower from which it is delivered to three circular bins, or silos, for draining. There it is left for 24 hours, at the end of which time the quantity of water has been reduced to 10 or 12 per cent, which is a moisture content that will bed the coal fairly well on the stoker grates so that not much of it will be lifted by the air pressure. Any greater moisture percentage might make it difficult to ignite the fuel, and less would drive unburned coal into the spaces between tubes and clog the boiler.

At the foot of the silos are chutes which deliver to a cross conveyor. This in turn drops the coal into the boot of the bucket elevator, which raises it to a chain scraper conveyor which rests on a bridge over the three silos and carries the coal to the bunker over the boilers, whence it can travel to any one of the four grates.



Rear view of power house showing stack on left and part of two out of three coal-storage silos at right with gantry leading from silos to bin above boilers.

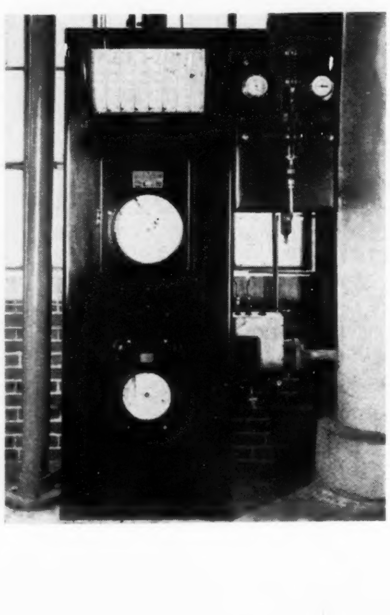
## To Deliver Steam to Mines

Each boiler, when run at 200-per-cent rating will deliver 40,000 lb. of steam per hour. Hence the four boilers when running will deliver 160,000 lb. of steam hourly, but, as it is customary to take the boilers off the line once every six months for reconditioning, the steam made at that rating sometimes will not exceed 120,000 lb. per hour. Just now, the pressure is 250 lb., and steam is supplied at 150 lb. per square inch to the breaker and colliery through three reducing valves on the header which receives steam from the four boilers. The 250 lb.-per-square-inch superheated steam is too hot for use in 150-lb. equipment, so water is introduced to lower the temperature to 450 deg. by three desuperheaters, one for each reducing valve.

The quantity of water these cooling devices admit is automatically regulated by the temperature of the steam. This steam now supplies one 24x48-in. hoist for Nos. 6 and 7 slopes, a similar hoist for No. 8, a 24x42-in. hoist in No. 12 plane, and a 24x36-in. hoist at No. 5 slope, also the Baltimore and the Red Ash 30x48-in. shaft hoists, one 16x26x10x36-in. plunger pump in the Red Ash, a 12x39x14x48-in. pump in the Baltimore and a 24x28-in. engine driving a 20-ft. fan. The steam pumps are to be replaced by electric units. A heat accumulator set near the shaft engine house meets the extreme demands of the shaft engine which exist only for the few seconds when accelerating the load. The heated water flashes to steam should the demand cause the pressure to fall.

With the turbo-alternator already mentioned, which is of the automatic extracting-condensing type, or both extracting and condensing, as desired, it will be possible with 160,000 lb. of steam per hour to bleed off 90,000 lb. of steam hourly for the needs of the colliery and still generate 7,500 kw. With 120,000 lb. of steam per hour, the colliery will get its 90,000 lb. of steam, but the turbo-alternator would then generate only 4,000 kw., although frequently the colliery would not need the full 90,000-lb. quota. The steam pressure at the turbo-alternator, of course, will be lower than 600 lb. per square inch; it may be only 575 lb., as a 25-lb. drop is to be expected.

Boiler meters by the indications of which air and fuel supplies can be regulated to get maximum efficiency.



## Condenser Provides Vacuum

A surface condenser is being provided having 6,500 sq.ft. of cooling surface in 1-in. Admiralty tubes 18 ft. long with a two-pass shell bolted directly to the turbine. This will give a vacuum of $27\frac{1}{2}$ in. Cooling water will be provided by a forced-draft cooling tower where 10,800 g.p.m. will be circulated by two pumps. The forced-draft tower will have four fans, each 11 ft. in diameter and equipped with a 20-hp. gear motor. The cooling range will be 15.3 deg. at 74 deg. F. wet-bulb temperature.

Two-stage steam-jet evactors will pump air and non-condensible gases from the condenser. Condenser circulating water will be pumped through a 24-in. asbestos-cement pipe to the cooling tower, and the cooled water will return through two similar 18-in. pipes. Thus each circulating pump will have its own suction pipe. Condensate will be pumped to the feed-water heater, and a surge tank will be provided so that, in case of a high demand for feed water, it can supply water for that purpose.

In addition to the turbo-alternator and the two compressors a 600-kw. motor-generator set with a 4,000-volt synchronous motor driving a 275-volt direct-current generator will be installed in the power house to furnish direct current around the shaft. Another unit will be a 125-kw. turbine-driven 3-phase 440-volt generator for emergency service. Almost all the high-tension distribution circuits will be placed in ducts, as also all direct-current conductors.

Ashes from the furnaces are delivered through horizontal gates into either trucks or mine cars. At present trucks are being used, and the ashes are being dumped for surface filling. Later, they may be utilized for ballasting tracks, but probably not for backfilling, as their disposition in that manner is too costly.

# BARGE-LOADING TERMINAL

## + Makes Illinois River a New Outlet For Buckheart No. 17 Coal

**• Movement of coal to market by water has been marked by substantial gains in recent years. Now comes the United Electric Coal Cos. with a new barge-loading terminal on the Illinois River to handle coal from its new Buckheart No. 17 mine, in Fulton County, Illinois. Capable of loading barges holding as much as 1,500 tons, the new plant includes a dump hopper for railroad cars brought in over 7½ miles of coal-company railroad, a belt-conveyor to the loading dock with a hinged loading boom and revolving discharge chute, the necessary docking and barge-handling facilities, a control tower, and other auxiliaries, as required. Maximum capacity of the terminal is twelve 50-ton cars per hour, and to date the plant, described in the accompanying article, has handled as many as nine cars per hour.**

TO MAKE "Buckheart" coal more easily and cheaply available to consumers on the Illinois River, the United Electric Coal Cos. last year completed a barge-loading terminal at Liverpool, some 7½ miles south of its new Buckheart No. 17 mine, in Fulton County, Illinois. This terminal permits shipment of coal up the Illinois as far northeast as Chicago, as well as down the river to consumers south and west of the mine. It is designed to load any of the various sizes prepared in the all-steel washing, screening and drying plant erected late in 1937 to serve the new Buckheart mine (*Coal Age*, March, 1938, pp. 49 and 52), producing coal from the Fulton County No. 5 seam.

The connection between the Buckheart preparation plant and the loading terminal is a 7½-mile railroad built by the coal company and equipped with a standard freight engine and thirty 50-ton hopper cars in which to haul the coal to the river. Construction of the railroad was started in June, 1938, while work on the loading terminal began in August. The first eight cars were loaded into a barge on Nov. 2, and up to March 13, 1939, the terminal was started up 39 times and handled 685 cars of coal. Although the rated capacity of the loading belt is 400 tons per hour, as many as nine cars (approximately 450 tons) have been dumped in 60 minutes. Under ideal conditions of free-running coal, it is believed that the dumping rate could be raised to a maximum of twelve cars, or 600 tons, per hour.

Approximately five miles of the new railroad was built down Buckheart Creek from the preparation plant to the East Liverpool levee, thence 2½ miles on the levee top to the terminal, which was located where the current sweeps the opposite shore, thus reducing velocity in the loading pool as well as aiding in keeping away ice, drift, etc. Straightening Buckheart Creek accompanied construction of the railroad, laid with 90-lb. rails on sawed wood ties with gravel ballast. Three 1½-cu.yd. draglines were employed in the creek-straightening and grading job, in addition to an Allis-Chalmers "SO" tractor with 7½-cu.yd. Continental scraper and an International TD-40 tractor with Bucyrus-Erie "Bullgrader." The grade was built up about 2 ft. above the level of the bottom land along the creek. Creosoted-timber bridges on concrete foundations were installed where necessary, while small streams were taken through the grade by means of corrugated Armco-iron culverts. Between the preparation plant and the levee the railroad crosses one State and three county highways. To complete the job, the line was fenced off with wire on steel posts all the way down the creek to the levee. All of the engineering work, bridge design and detail, as well as the actual construction of the railroad, was done by the engineering and operating staff of the United Electric Coal Cos.

The loading terminal was designed by the Koppers-Rheolaveur Co. in collaboration with the engineers of the United Electric Coal Cos. The Koppers-Rheolaveur Co. also designed and built the Buckheart No. 17 preparation plant. Construction of the terminal, however, was contracted to the Warner Construction Co., of Chicago. Essentially, the terminal consists of a dump hopper, a belt-conveyor gallery to the drive house and loading boom, and the dock and control tower at the edge of the loading pool. The dump hopper is built in the levee itself. As the first step, a dirt-filled cofferdam in the shape of an arc was built of interlocking steel piles 48 and 55 ft. long on the river side of the levee. The hole for the hopper then was dug out in the levee behind this cofferdam and forty-two 35-ft. creosoted piles were driven as a support for the concrete hopper structure, from which a tunnel through the steel piling extends up and out toward the river as an exit for the conveyor. The river end of this tunnel is supported on four 60-ft.-long H-beams driven to the proper depth, and the mouth of the tunnel is some 2 ft. above the highest-known water level.

The top of the hopper structure came 4 ft. above the top of the original levee, and consequently it was raised this much for some distance back as an approach. Later, the government plans to raise the entire levee 4 ft. and also will relocate a part of it to widen the flood channel of the river. In that part of the raising done by United Electric, the

A belt conveyor takes the coal to the loading boom and dock. The conveyor structure is supported on creosoted piling. When this photo was made, the river was in flood.

steam locomotive and side-dump and end-dump cars were employed, the dirt being hauled in from a loading point 3 miles distant. With the concrete hopper structure in place, the hopper itself, consisting of steel plate, was installed. In some respects, this hopper might be considered as two, inasmuch as it is divided and feeds out of two openings.

Hopper capacity is one car, and the coal is fed out by a double-acting reciprocating feeder driven by a 15-hp. motor. This motor, like all others in the plant, is a General Electric unit. A small centrifugal pump equipped with automatic float control and driven by a 1½-hp. motor is installed in the bottom of the hopper structure. At the present time, the loaded cars are handled at the dump hopper by a 15-ton Davenport gas-electric locomotive, but later it is planned to extend the track 500 ft. past the hopper and install a car retarder so that the whole trip may be lowered by gravity to the dumping point and unloaded car by car. New bottoms are being installed in many of the cars to facilitate this latter operation by permitting the coal to run more freely.

Distance from the center line of the hopper to the dock in the river exceeds 400 ft., with the belt conveyor at right angles to the hopper center line. Total length of the conveyor from pulley center to pulley center is 412 ft., of which 60 ft. consists of a hinged loading boom carrying a revolving discharge chute. From the feeder under the dump hopper the conveyor comes upon a 300-ft.-radius vertical curve onto steel-truss bridge members supported on A-frames each resting on creosoted-pile bents. These bents take the conveyor across the borrow pit left in the construction of the levee and over the intervening neck of land to the drive-house. Each bent consists of five piles 58 ft. long, the fifth in each case being upstream to act as ice breaker. The drive-house is supported on fifteen creosoted piles 57½ ft. long and contains the 50-hp. belt motor and the necessary drive, idler and belt-tensioning pulleys and counterweights. The belt itself, a 36-in-wide Goodyear unit, is carried on Koppers carrying and return rolls.

The loading boom is hinged just inside the river end of the drive-house, while the other end is supported by a double-drum Shepard-Niles boom hoist, each drum with a load-carrying capacity of 10,000 lb. The discharge end of the boom can move through a vertical distance of 19 ft. to compensate for differences in water level and also to get the necessary throw for different widths of barges. On the end of the boom is a revolving loading chute which can be rotated through 360 deg. by another Shepard-Niles boom hoist, thus making it possible to get exact placement of the coal to trim the barge properly and prevent segregation of fine and coarse material.

### Barges Up to 1,500 Tons

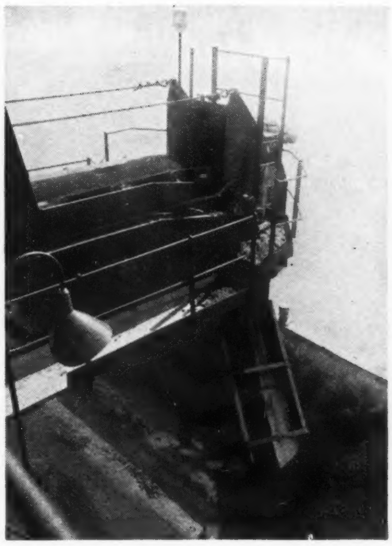
Capacity of the loading pool is about three barges in line along the dock above the loading point and three below, although six can be accommodated both above and below by doubling up. The barges usually loaded have a capacity of about 850 or 1,200 tons, with the largest, 42 ft. wide, holding around 1,500 tons. To make the loading pool, the river bed was dredged west of the channel for about 1,200 ft. above and below the center line of the conveyor. When this dredging was completed, a channel was cut into and through the levee borrow pit just above the location of the conveyor bent line to permit pile-driving and erecting equipment to be moved in. Piers and cluster piles were lined up at the shoreward edge of the dredging, which in turn is the docking line. From this docking line the

The loading boom is equipped with a revolving loading chute. The boom hinge is in the conveyor-drive house at the right on creosoted piling. The control tower and boom supports rest on a rock-filled interlocking-pile pier.

dredging was sloped up toward the shore.

Barge shifters, the supporting structure for the free end of the loading boom, and the control tower are mounted on a pier consisting of three cells of interlocking piling filled with 2-in. washed gravel. The end cells consist of 55- and 57-ft.-long piling, are 19½ ft. in diameter, and are capped with reinforced concrete. Elevation of the tops of these caps is 455 ft. above mean tide, which also is the elevation of the tops of the piles under the drive-house and in the bents under the bridge. Filling the space between the end cells of the pier is a partial cell of shorter piling, which brings the top of this cell down to permit the proper vertical movement of the loading boom. As compared with 455 ft. to the tops of the high-cell caps, "normal" water level now is 431.4 ft. Later, when further work is done by the government, the level will be 429.4 ft. Highest-known water level was 451.4 ft.

For docking and mooring purposes, pile clusters are driven along the docking line for 635 ft. above and below the center line of the conveyor and pier. In all there are ten clusters above and eleven below. In all but two instances, these clusters consist of seven untreated piles. The exceptions, one above and one below, are 13-pile clusters, which carry the sheaves around which the barge-shifting ropes are passed.



Close-up of the discharge end of the loading boom, under which is the revolving loading chute.

Barges are handled during loading by two Link-Belt barge-shifters, one on each side of the pier so that a positive pull is available at will in either direction. These shifters are operated by 15-hp. totally inclosed motors, and the drums hold about 600 ft. of ¾-in. hemp-center rope. Each shifter is equipped with a Thrustor brake and each is operated by a separate drum-type controller. The first point on each controller releases the brake, while the remainder provide power winding or unwinding, as desired. Aside from the barge shifters, all other motors in the terminal are started and stopped by pushbuttons. All wiring is in conduit and totally inclosed watertight light switches are used throughout the plant.

# 350-TON DAILY OUTPUT

## + With 35 Men and 2 Conveyors

## From 35-In. Seam in Oklahoma

*One of the group making up the Henryetta field of Oklahoma which has gone to conveyors to reduce costs and preserve markets is the Atlas Coal Corporation. Two shaker conveyors at this company's Atlas No. 2 mine, which provide all the coal for which a market is available at the present time, are used as the occasion arises either entirely in room or development work or partly in rooms and partly in headings. In the one month of good working time available up to March 1 in the 1938-39 season, the two units—in rooms—averaged 350 tons per day of two seven-hour shifts in 34- to 36-in. coal. On this basis, output per man employed underground per shift was 10 tons. A marked increase in coarse-coal output has followed conveyors and breaking down the coal with carbon dioxide.*

THE Atlas Coal Corporation was founded by William Steckelberg, who first started operations near Dewar, Okla., in 1905 and opened Atlas No. 1 mine in 1914, three years later moving to No. 2, only a short distance away, and abandoning the No. 1 opening. No. 2 thus is about the oldest commercial mine in the Henryetta field under the same management, which now includes Carl and Fred Steckelberg, sons of the founder, with William Lewis as mine superintendent.

Atlas No. 2 is a drift operation in the Henryetta seam with, as noted above, a fairly uniform thickness of 34 to 36 in. Depth of cover over the present working territory—about 1½ miles from the drift opening—is 135 to 140 ft. Underneath the seam is a fireclay. Over it is a 4- to 6-in. layer of sulphur and bone locally known as the "iron band." The iron band is followed by shale about 40 ft. up to a sandstone. The general development plan is based on a main entry from which room entries are driven both right and left at an angle of 90 deg. Room entries consist of three headings, and rooms 85 ft. wide on 115-ft. centers are driven both ways from these entries substantially as in Fig. 2. Room depth is 275 to 300 ft. Pillars are left in place. In all headings in which track is laid, headroom is provided by taking down top to give a clear height of 5 to 5½ ft. over the rail.

In the old hand-loading days,

rooms were driven 45 to 50 ft. wide and about 200 ft. deep. Two tracks were laid into each place. Naturally, no top was taken in rooms, and the cars—standing only 23 in. over the rail—were pushed in and out by the miners. The two shaker conveyors were installed in the last days of May, 1938. Originally, both were employed in rooms, but in August, 1938, a duckbill was purchased for use in wide headings and one unit since has been used for development as required. The conveyors and duckbill are Goodman units with the new flywheel-type G12$\frac{1}{2}$-B-86 drives (B—or medium-intensity—motion, 86 strokes per minute). Fulcrum jacks with 90-deg. angle troughs are used to turn the conveyors across the faces in rooms. The duckbill is used only in wide headings, as will be detailed below. Cardox (2-50 cartridges) was installed along with the conveyors—Atlas and another company jointly purchasing a shell-charging plant. Originally, the idea behind Cardox was to get a permitted medium of breaking down coal on the shift. Approval since has been granted for the use of permissible explosives and they now are employed in headings and for the breaking-in shot in the right-hand corner of rooms. As stated above, lump output is substantially higher since the installation of conveyors and Cardox—an important consideration in the markets served by Henryetta-field mines.

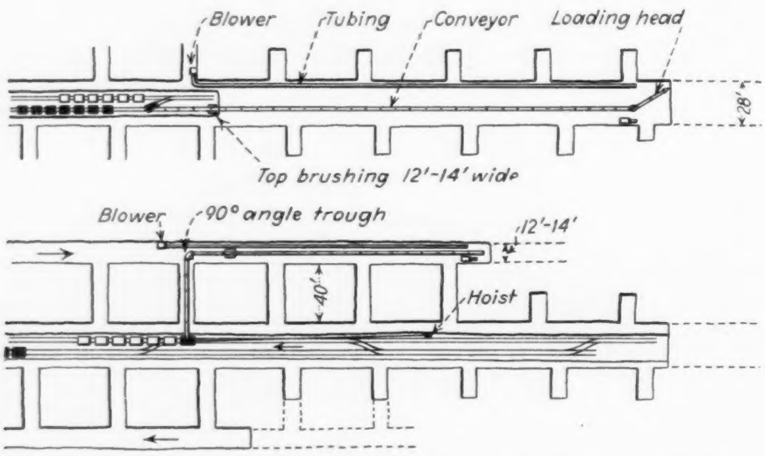



**Fig. 1—Entry-driving methods at Atlas No. 2 mine. Above is a diagrammatic plan of the conveyor, blower and track set-up in driving the center heading. Below is shown how the back heading is advanced by means of a 90-deg.-angle trough to permit loading on the center heading.**

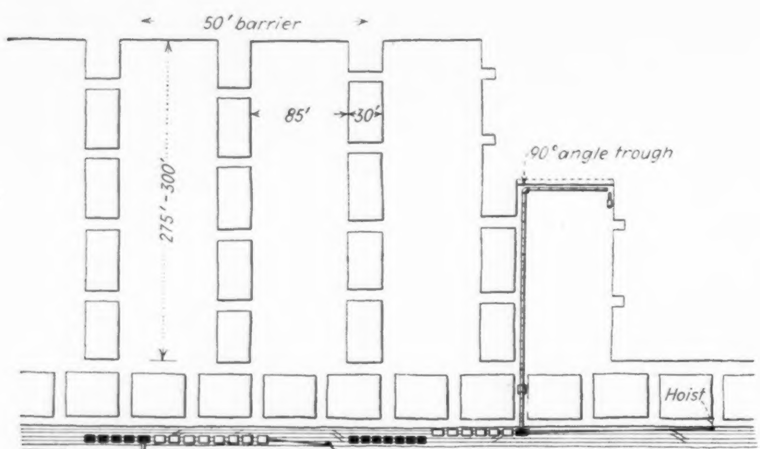



**Fig. 2—Showing diagrammatically how rooms are worked with 90-deg.-angle troughs at Atlas No. 2. With two separate units, they are separated about as shown and placed on opposite sides of the room entry to provide trip-changing room. Working the two units in adjacent rooms with a cross conveyor to make possible a common loading point is under consideration.**

Each conveyor is accompanied by a "Brownie" BB tubing blower ("Mine-Vent" tubing), a Hardsocg post-mounted hand drill using Hardsocg twisted augers, cutter heads and bits, and a Sullivan CE-7 shortwall cutter with Bowdil thin-kerf ($3\frac{3}{4}$-in.) bar 6 or $6\frac{1}{2}$ ft. long. Lengthening bars is under consideration. The thin kerf reduces bug dust nearly 40 per cent, as compared with the standard kerf, while the throw-away cutter bit has given the expected advantages of a lower bit cost due to elimination of transportation and sharpening, plus a higher tonnage per bit, less power, and less wear and tear on the machines. In fact, the advantages of thin-kerf bars led to their installation even before conveyor mining, at which time the present lengths of cutter bars were adopted because they were more suitable for hand loading.

## Center Heading Driven First

The three headings comprising a room entry are driven one at a time, starting with the center opening. The practice is to extend this center place about 300 ft., using a blower and tubing and driving the crosscuts half way through. As it is the haulageway, the heading is driven 24 ft. wide, using the duckbill, and later is brushed 12 to 14 ft. wide, or enough for two tracks. With the center heading driven up, the side headings, first one and then the other, are advanced the same distance. These side, or "back," headings are driven 12 to 14 ft. wide and, because of their narrowness, the duckbill is not used. They are, of course, not brushed. In advancing back headings, the drive is located as in Fig. 1 and a fulcrum jack and 90-deg. angle trough is used to bring the conveyor through the crosscut to the loading station in the center heading. Two tracks, as indicated above, are laid in this center heading, with crossovers about as shown in Figs. 1 and 2. One track is used in working on one side of the entry and the other when a move is made to the other side. While the conveyor is in the center heading, however, only a stub track just long enough for car changing is laid. The conveyor is placed about where the other track would be and cars are loaded on the crossover.

The face cycle in headings follows the usual routine of cutting, drilling, extending conveyor, timbering, loading holes with $1\frac{1}{4}$x8-in. Hercoal F-1 permissible explosive, and shooting. In the center, or wide, heading, the coal is loaded with a duckbill and in the side, or narrow, headings, hand

loading is the practice. In either case, the bottom is scrapped, as loading is carried on both to salvage the coal and secure the extra height. Using four-man crews and the duckbill, the normal performance in a 28-ft.-wide heading has been 5 to 5½ cuts 5 or 5½ ft. deep in two shifts of seven hours each. In the 12- to 14-ft.-wide back entries, the usual figure is six or seven cuts in two shifts.

Hand brushing of the center heading has been the rule to date, primarily because it released the conveyor for driving the side openings and thus speeded entry advance. With less pressure for development, however, the conveyor will be used for transporting brushings in the future and, as development primarily will be a task for summer, when demand is light, the conveyor can be spared for the rock-handling job.

William Lewis, superintendent (second from right), looks over the coal while loading is going on on an 85-ft. room face.

## Crosscuts Are Room Necks

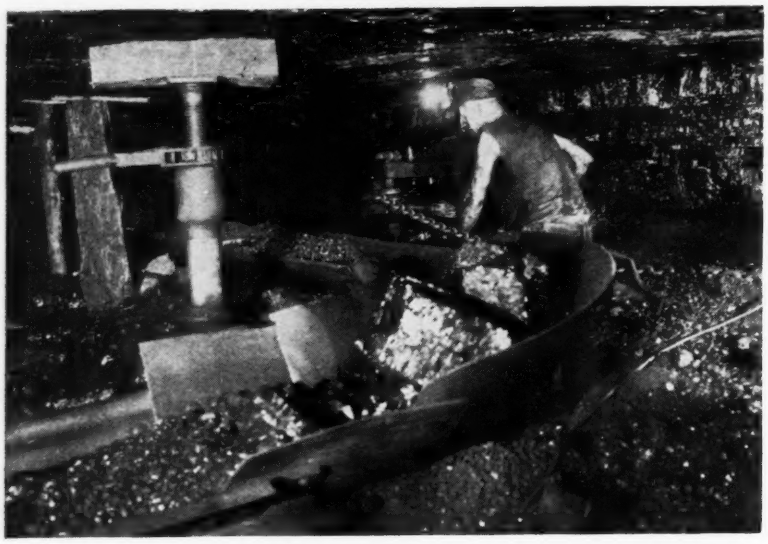
In driving rooms, they are started directly off the side headings, with a crosscut from the center to the side heading serving as the neck in each case. By driving the side headings and using the crosscuts as necks, room is provided for setting the drive and turning the conveyor directly along the heading rib in starting rooms. Thus, room advance is on the normal system from the time the first cut is made. Crosscut location is adjusted as the entry is advanced to make this plan possible, and crosscuts on opposite sides of the center heading on a room entry are staggered slightly as a rule, about as indicated in Fig. 2. Therefore, rooms on one side of an entry are not directly opposite those on another.

Loading room coal under the eye of Fred Steckelberg (behind the jack pipes). The car height will be increased 12 in. in the near future.

As all loading is done on one heading—the center—and as turning one conveyor to discharge into the other, and thus make possible one loading point, has been found less satisfactory than operation as separate units, the question of supplying each with cars when both are working in rooms on a single entry has been solved by placing one unit in a room on one side and the other in a place two or three rooms down on the opposite side, as indicated in Fig. 2. Thus, space is provided between the two loading stations for the necessary car storage. A common loading point for both conveyors is more desirable, however, from the standpoint of eliminating some of the delays now encountered with two stations, and therefore the use of an auxiliary cross conveyor is under consideration. The two main conveyors then would be operated in adjacent places, with one discharging into the cross conveyor in the side heading, which in turn would carry the coal to the second unit for final transportation to the car.

In room work, the conveyor drives, under the present system, are set in entry crosscuts opposite one side of the room; thus, the conveyors are some 5 to 7 ft. from one rib as the places advance. With a face width of 85 ft., seven 10-ft. pans are carried along it, and the conveyor is turned, as stated above, by means of a fulcrum jack and 90-deg. angle trough. The jack originally was equipped with a base about 4 in. square, which has been replaced by a 12-in. square base to give a greater bearing surface on the floor. With this change, little difficulty has been encountered in keeping the jack in place even with 70 ft. of pans along the face. And what difficulty is encountered occurs when the rooms near their maximum depth of 275 to 300 ft.

Except for a stop each cut to move the face pans forward and extend the main conveyor, face operations are continuous. With a fresh cut, loading starts in the right-hand corner of the room and is carried to the left across the face, the loaders taking the bottom left by the machine as they go. As soon as space is available, the cutting machine is



The cutting machine follows the loaders across the face. In the foreground is the 90-deg.-angle trough and fulcrum jack used to turn the conveyor.

sumped in and follows the loaders, in turn followed by the drill, although drilling may be done ahead of the machine if it seems more feasible. Normally, an 85-ft. face is shot with four or five holes started about 12 in. down from the top and angled up to the iron band at the back of the cut. The right-hand, or corner, hole is loaded with permissible and the remainder with Cardox. The coal is spragged at each hole location to enable the breaking medium to function more efficiently, as the lower part of the seam tends to set down when cut.

With the above operations completed, the next step normally is to move the face pans up to within 3 or 3½ ft. of the face, which is done by loosening the C-clamps on the extension section back of the angle drive and then sliding the line of face pans and drive forward as a unit, resetting the fulcrum jack and retightening the C-clamps. If necessary, a 10-ft. pan also is placed during this operation. The face then is shot and loading starts. At the same time, one man starts extending the timbering, which consists of single posts on 4- to 5-ft. centers, with the last row just behind the face pans. In connection with breaking down the coal, it might be pointed out that the charges are light, as the principal object is just to crack up the face and loosen it from the roof so that the loaders can pick or bar it out, shoveling the small material onto the conveyor and lifting the large chunks by hand.

Room crews on the present basis consist of seven men, one of whom oversees loading at the conveyor discharge. The remainder work at the face, with cutters and drillers loading coal when not engaged in their regular tasks. In fact, all men on the crew turn their hand to any task that needs to be done when not working at their regular jobs. With both conveyors working in rooms, average output per day in the month of the best running time this winter—November—was 350 tons (two seven-hour shifts). In that month, the underground force consisted of the following: four conveyor crews, 28 men; two motormen, one electrician, one tracklayer and extra man, one fireboss, one night foreman and one mine foreman, or 35 per day.

### To Increase Loading Time

Contemplated equipment changes are expected to reduce conveyor stoppages and thus increase actual loading time. One change, as noted above, is the installation of a cross conveyor to bring all coal to a common loading point. Another is installing side boards on the mine cars to raise their height from 23 to 35 or 36 in. The latter, in particular, is expected substantially to reduce time losses by decreasing car changes for the same tonnage. Empty cars usually are brought in to the loading stations in trips of fourteen, the locomotive cutting off at the crossover below the station, as indicated in Fig. 2, and going over to hook onto the loads on the other track. The empties are hooked onto a rope leading back to a Brownie HJE hoist, and usually seven at a time are pulled up the hill past the conveyor. When these seven are filled, they are dropped through the crossover onto the loaded track and the other seven are put through the same process. However, the method of handling trips in and out of loading stations naturally may be varied to suit conditions.

Placing a carbon-dioxide shell in preparation for breaking down the coal after cutting is completed and the conveyor has been moved up to the face.

# GRAPHIC MAPS

## + Spotlight Changing Seam Conditions

By DANIEL D. JENKINS, 2d
*Retsof, N. Y.*

A GRAPHIC method of presenting information on certain variable characteristics of coal beds has been for some time in use in the engineering department of a large bituminous coal company with mines in West Virginia and Kentucky. The method is simple, highly effective in showing relationships between seam characteristics, easy to use, and can be applied to a great variety of conditions.

The analysis of channel samples and samples taken by means of a jury table from cars loaded on various sections furnishes the information which is used. A base map is first made on tracing cloth to a scale of 500 ft. per inch. On this base map main-line haulage and room entries are shown by heavy ink lines, each pair of entries being shown as one line. Outcrops, property lines and other boundaries are shown by narrower lines. No rooms, pillars, or other information is shown, as to do so would obscure the map and make the plotting of other data difficult.

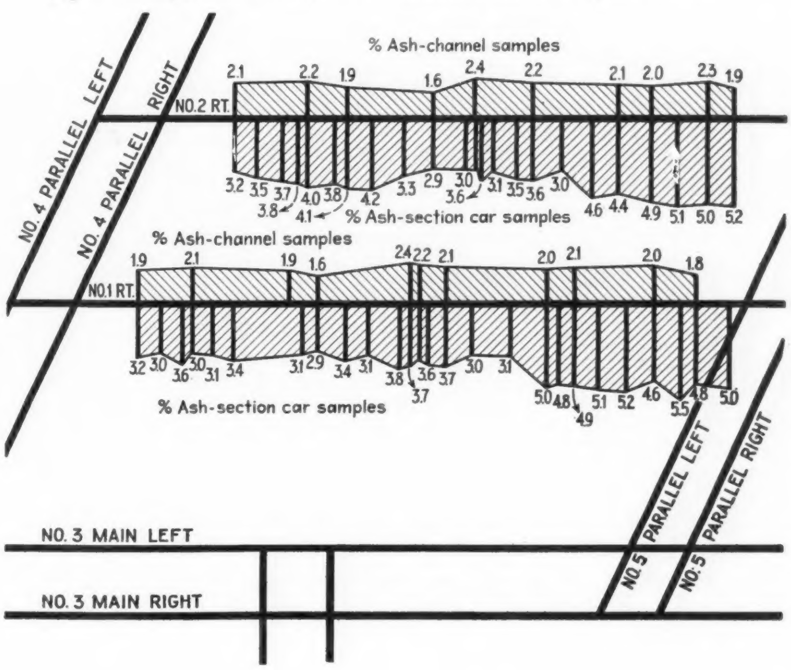
On the lines representing entries, at the approximate place where each channel sample was taken, various seam characteristics, such as ash, sulphur content, fusion temperature, and volatile matter, are plotted to a suitable scale on lines drawn perpendicular to the entry line. To simplify the work, in the case of samples taken from places at a distance from the entry, such as advancing room faces or pillar lines, the results of the analysis are plotted on the nearest entry line, as above. The points obtained are connected by fine lines, forming a graphic running record of conditions. White prints can then be made of the resulting graphic map, and these are later colored to make the information stand out more vividly. The base map can be readily brought up to date as laboratory results are received, or it can be posted at intervals of three to six months as the mine surveys are plotted. The latter plan was generally followed.

The secret of obtaining clearness in these graphic maps lies in the selection of the proper scale in plotting the seam characteristics. Too small a scale makes plotting the information difficult, while too large a scale may cause plotted data on two or more adjacent entries to overlap. Plotting usually is done with a scale divided into 50 parts per inch, the numerical value of each point being written in small figures near it. As sulphur, ash, and fusion temperatures were the quantities usually plotted, it was found that the best results were given by plotting the sulphur as the lowest of the three graph lines; the per cent ash as the intermediate line; and the fusion, which in this coal often varied widely between successive samples, as the topmost line.

Much is added in ease of interpretation of the maps by the use of colors to represent different quantities. Sulphur is shown by a yellow tint, ash by green or brown, and fusion by light red.

The time required to plot the results for a three months' period of a 2,500-ton mine where channel samples are taken twice a week and car samples from the different sections daily is only about three hours for one man. No other method of presenting this information has been

Fig. 1—Comparison of inherent and mine-run ash in a typical section



**DANIEL D. JENKINS, 2d**

**Kentuckian by birth, Welsh by descent and miner by inclination reinforced by environment, the author started his coal career as a loader in Harlan County. After serving as trackman and welder, he entered the engineering department of one of the large producers. The early depression years were spent at the Missouri School of Mines. He reentered the coal fields in 1934, this time in southern West Virginia, where he served as draftsman, junior engineer and statistician. On Jan. 1, 1937, he migrated to New York State to become mining engineer for the Retsof Mining Co.**

so economical in time and labor or has given such clear, quickly grasped results.

To date these graphic maps have been applied chiefly to the presentation of three classes of information. First and most important so far has been the comparison of inherent ash in the seam as determined from channel samples and the percentage of ash shown in run-of-mine samples from the sections. The graphic map of one such section is shown in Fig. 1. The per cent of inherent ash is plotted above the entry line at the point where the channel sample was taken. Below the line, at approximately the position where the workings stood when the sample was taken, the ash percentage in the run-of-mine samples is plotted to the same scale.

The care with which the coal was cleaned on each section is then readily apparent as the difference between the heights of the plotted areas on each side of the line, and thus the general trend of both the inherent ash and the run-of-mine ash is clearly shown. The pronounced rise in ash in the section car samples that can be seen near the right end of the plotted series indicates the effect on clean coal of the replacement of a foreman who had been on the section for several years by a less experienced man.

A second use to which these maps have been put is the foreshadowing of unusual or special conditions in the seam which are reflected by the map. In Fig. 2 this is illustrated. The mine which this map represents has a large body of very low ash coal on the right-hand side of the main entry as compared to that on the left side. One end of this area was delimited when the sample results for 1st and 2d Rights were plotted. It will be noticed that the 3d Right samples show this area of low-ash coal trending rapidly to the left, so that apparently it will cross the main headings a short distance in advance of where they now are. It is evident that changes of this sort can be much more easily discovered and followed on such a graphic map than when presented on an ordinary map or in the form of figures or laboratory reports alone.

In cases where the two benches

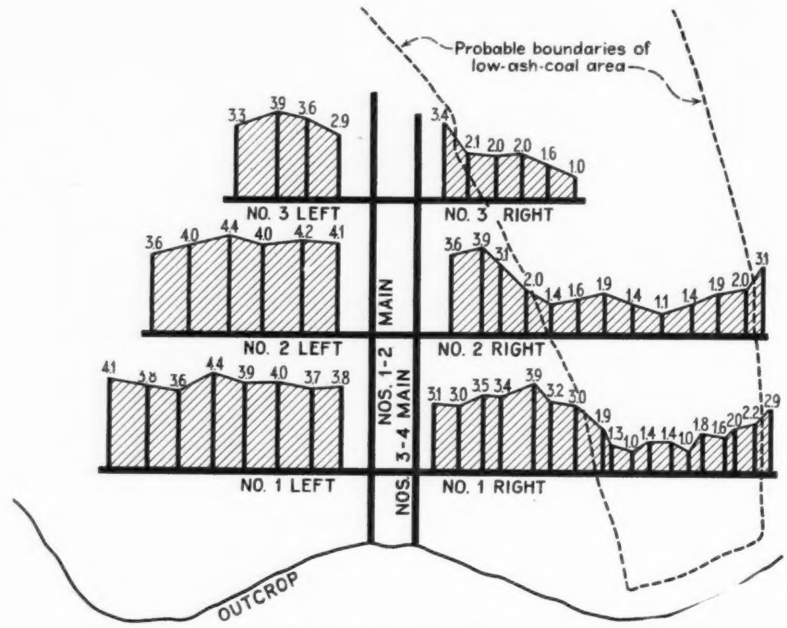



Fig. 2—How the graphic map shows special conditions in a seam

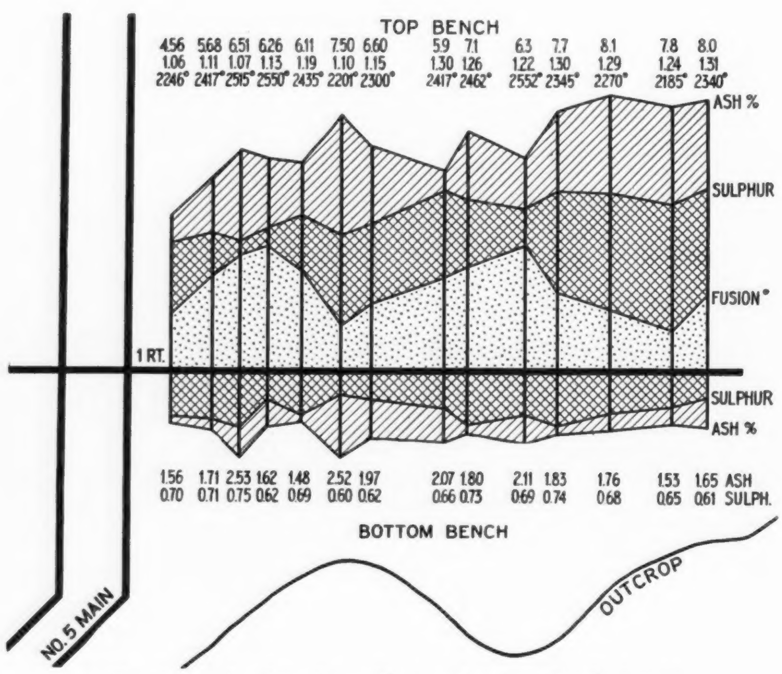



Fig. 3—Application of graphic mapping to a benched seam

of the same seam or two seams in close proximity are mined together, the graphic map offers a clear and ready means of comparison between them; a comparison that would be difficult or impossible by almost any other method employing figures alone. Fig. 3 is a redrawn portion of a graphic map of a mine where two benches of the same seam are mined together but are loaded separately for shipment to different customers. It will be seen that the sulphur present is increasing in the top bench and remaining constant in the bottom bench. Such a condition is very clearly shown by this method of presentation. The lines of figures above and below the graphic map of Fig. 3 represent the numerical value of the points plotted. On the actual map, which is to smaller scale than the redrawn portion shown, these values are written in small figures near the point itself, where they show through the overlaid colors.

# VIBRATING-SCREEN PLANT

## + Provides 5-Size Preparation at Low Cost

## At Carbon Fuel No. 3 Mine

By CARL SCHOLZ
*Consulting Engineer*

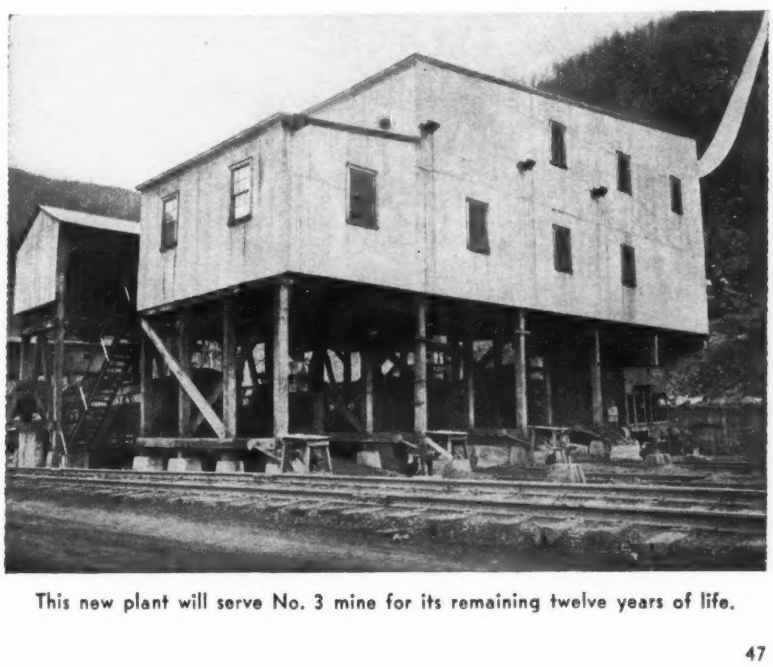
and J. H. EDWARDS
*Associate Editor, Coal Age*

• Balancing available unmined tonnage in a partly worked-out acreage against the capital investment cost of a modern preparation plant has been accomplished by Carbon Fuel Co. Low-cost hand and conveyor loading, plus efficient preparation to enable the successful marketing of domestic and steam sizes, brings mine No. 3 from an idle property to an initial production of 450 tons, with 1,000 tons per day as the ultimate objective. Only a 12-year life can be figured for amortizing the equipment used in recovering coal from this acreage.

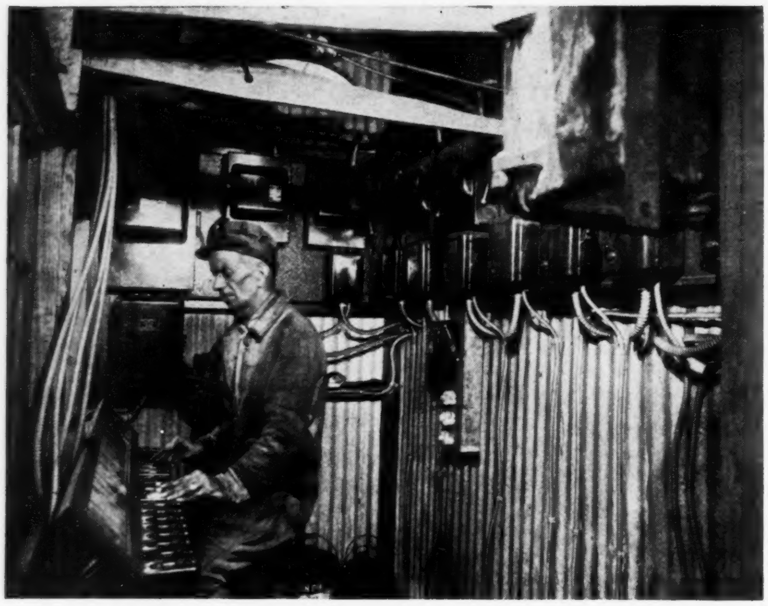
TO BUILD a new 200-ton-per-hour plant that would afford effective and efficient preparation of five sizes for domestic and steam markets and hold the construction cost within economic limits for a mine of twelve years' remaining life was a problem solved by the Carbon Fuel Co., Kanawha County, West Virginia. In this plant the primary and secondary screens and the transfer chutes with rescreens are of the vibrating type. Picking tables and loading booms for the lump, stove and egg sizes are belt conveyors. Telescopic chutes of a mixing and crushing system provide for delivering junior sizes to either lump or egg booms. Complete rebuilding of a 1,366-ft. rope-and-button conveyor and redesigning of a rotary dump to suit the new conditions were included in the project.

No. 3 mine, where this new plant was built, is a drift operation in the Dorothy seam, which for the most part consists of splint coal but contains some gas coal. The bed lies 1,904 ft. above sea level and outcrops 604 ft. above railroad elevation. It was principally with the output from this mine that the company built up a reputation for its "Carbon Splint" domestic coals.

Other mines were opened in the same seam and in 1928 in the interests of concentration the No. 3 mine was closed down. A roof which holds up well with time was the reason for closing this mine instead of some other. A few years ago, however, it was decided to clean up the mine and make plans for reopening when demand would increase and at that time the track gage was changed from 42 to 44 in. and new 4-ton



This new plant will serve No. 3 mine for its remaining twelve years of life.



A. V. Pettit, tipple foreman, demonstrates the control panel.

solid body cars were purchased to replace the original wood cars. At that time a rotary dump was installed in the headhouse.

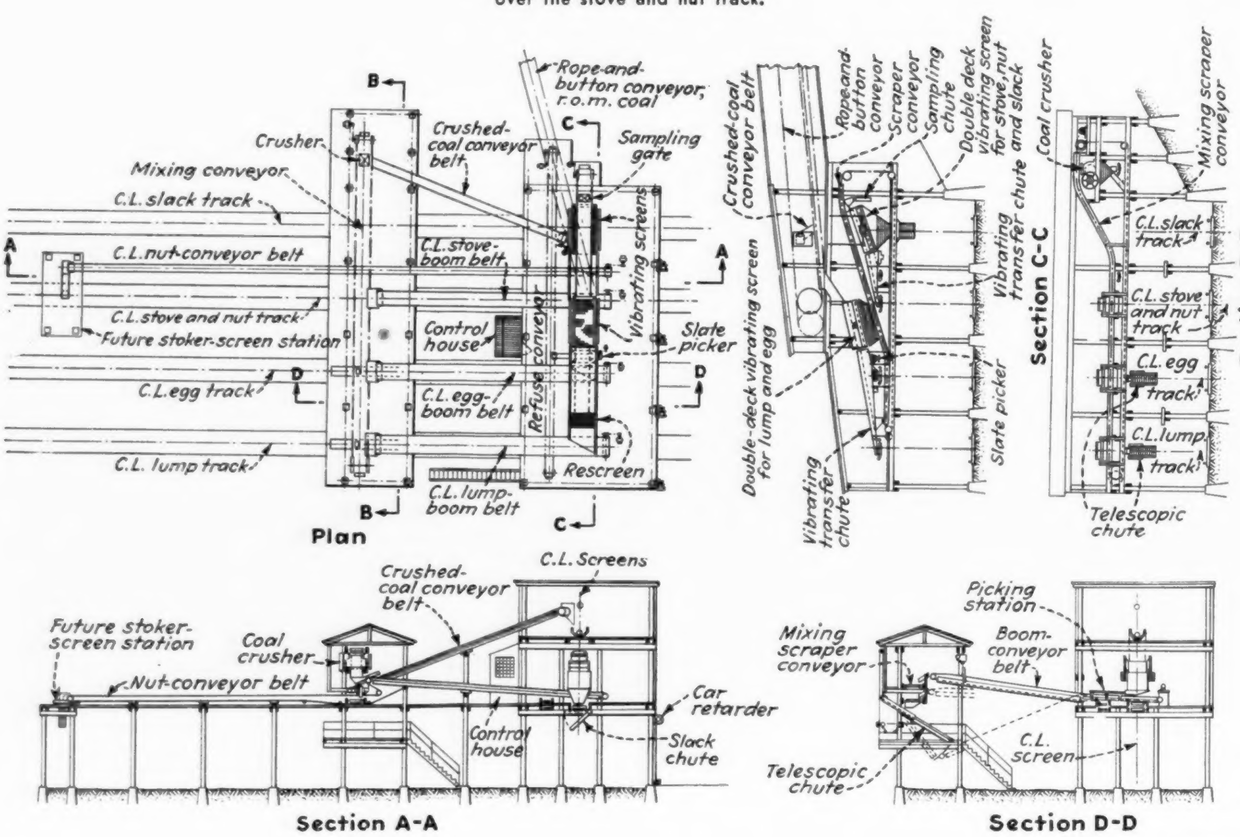
Decision as to a new tipple awaited the working out of plans for a construction to come within limits prescribed by the total tonnage available. Although some coal was left in the original mine, as a whole it was considered 70 per cent worked out. With the perfection of conveyors and their promise of economical use in mining a low-coal territory formerly considered unworkable, a considerable tonnage was added to the mine and this brought the aggregate of recoverable coal to 300 acres.

It was decided to build the new tipple on the site of the old and to reconstruct the rope-and-button conveyor to a more satisfactory contour, thus eliminating rope pull-out troubles formerly encountered at the bottom curve. At the headhouse, in order to avoid disturbing the general layout of tracks and dump, this conveyor relocation involved a change in the rotary-dump design to provide sufficient clearance above the feeder. Details of this rebuilding of the dump, a unique feature, will follow later in the article.

The tipple framing is of wood which was cut and sawed on the coal company property. Tipple equipment was designed and furnished by the Robins Conveying Belt Co., represented by R. U. Jackson, of Charleston, and the construction work, including setting the machinery, was handled by the construction department of the coal company. The tipple serves four loading tracks and its dimensions are: main part, 32x72 ft.; and mixing and crushing shed, 18x78 ft.

Design was predicated on sizing and loading 200 tons per hour of run-of-mine coal to the following sizes and proportions: plus-5-in. lump, 88 t.p.h.; 3x5-in. egg, 24 t.p.h.; 2x3-in. stove, 20 t.p.h.; 1x2-in. nut, 30 t.p.h.; and 0x1-in. slack, 38 t.p.h. To accommodate loading the five sizes on four tracks a level belt 20 in. wide carries nut or pea, as the

As indicated by Section C-C of these general arrangement drawings, the rope-and-button conveyor extends over the stove and nut track.



case may be, 150 ft. below the main part of the tipple to be loaded by chute on the stove track.

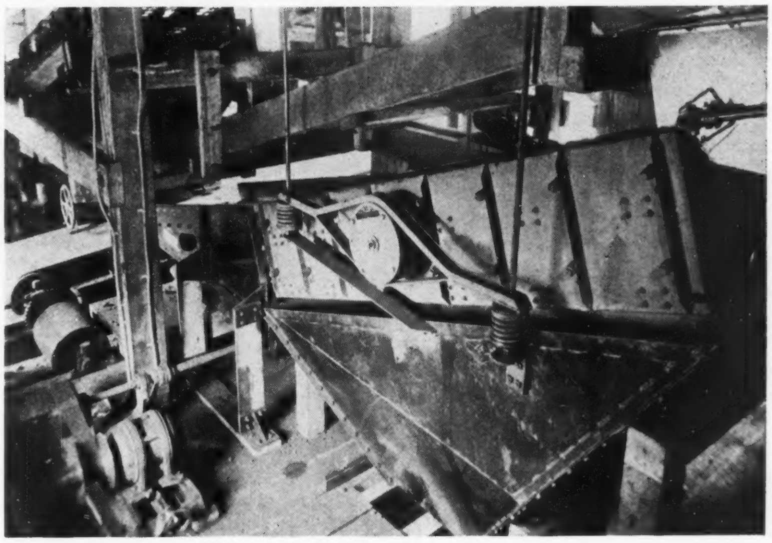
Run-of-mine from the rope-and-button conveyor flows to the upper deck of a 60x120-in. Gyrex screen operating at $\frac{1}{2}$-in. stroke and 550 r.p.m. This vibrating-type screen was selected because of the small space, minimum weight and minimum vibration on supporting structure, accuracy in sizing, flexibility as to size opening, and minimum degradation. It is the belief, however, that the rapid vibration of this type of screen does develop the powder cracks in the coal while being screened and therefore better prepares it for the ride and handlings to the market. Decks of the screen—upper, 5-in. opening; lower, 3-in.—are equipped with the improved Super-Gyraloy cloths and are arranged for easy changing for a different sizing or for renewal.

### Vibrating Chute Moves Coal

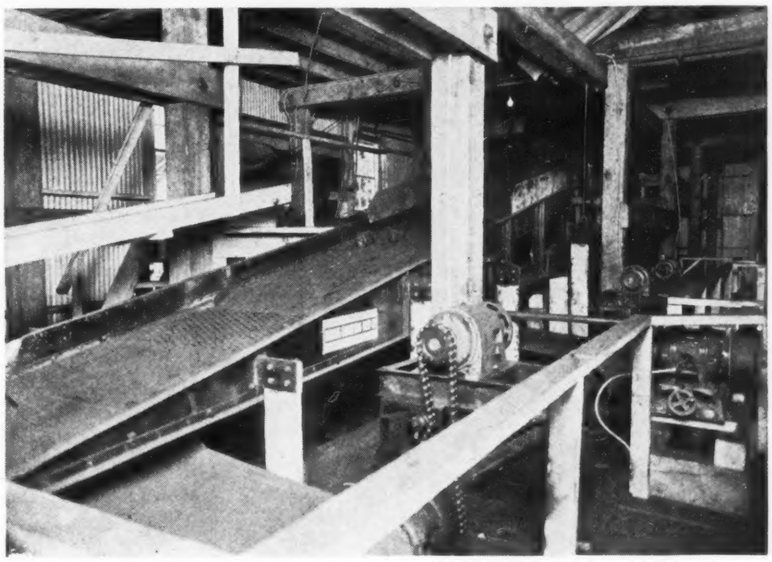
The 5-in. lump and 3x5-in. egg sizes from the Gyrex are carried to the respective picking tables by a vibrating chute having an upper branch 4 ft. wide and 22 ft. long, and a lower branch of the same width and 6 ft. long. Each branch contains a rescreening section 4 ft. wide and $2\frac{1}{2}$ ft. long. This vibrating chute is supported on flexible wood slats from the floor framing. Throughs from the bottom deck of the Gyrex and also the throughs from the lump and egg rescreens are carried back upward by a scraper conveyor to a Vibrex screen. This scraper conveyor has 36-in. flights and the centers distance is 48 ft.

The Vibrex screen, a double-deck Type H 48x120-in. unit operating at 1,800 r.p.m., also is equipped with improved Super-Gyraloy cloth. Sizes made by this screen are distributed by another wood-slat-supported vibrating chute having an upper branch 4 ft. wide by 9 ft. long and a lower branch 4 ft. wide by $2\frac{1}{2}$ ft. long. Overs from the upper deck are delivered to the stove table; overs from the lower deck to the nut or pea conveyor, which extends down the track, and throughs from the bottom deck to a hopper and chute above the slack track.

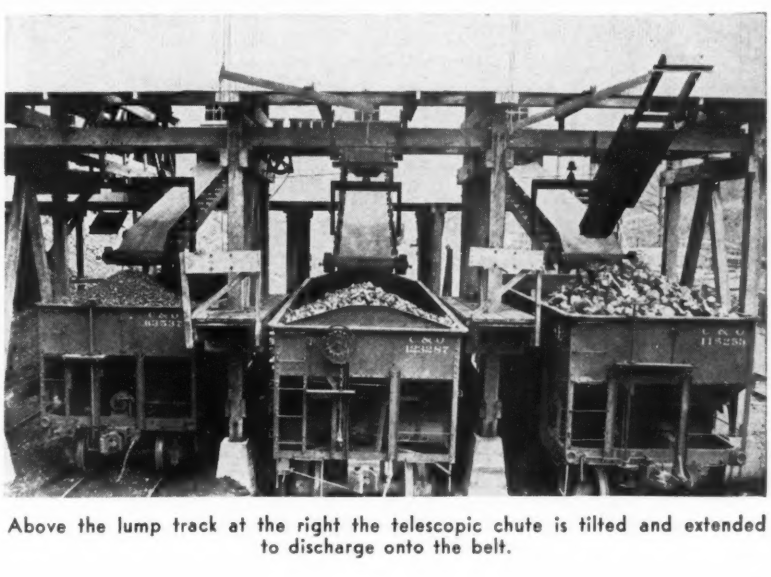
Picking tables and loading booms are belt conveyors having Timken-bearing top idlers (flat for the picking-table sections and troughing for boom sections) and Shafer roller-bearing return idlers. All three of the units have 18-ft. level picking sections and 32-ft. hinged loading-boom sections. Belt widths are:



Secondary sizing also is done with a vibrator. Its "overs" are distributed by a vibrating chute whose motor and variable-speed drive appear at the left.



Left foreground, vibrating transfer chute with rescreens; upper background, the vibrating primary screen. Gearmotors and roller chains drive the three belt tables and booms.

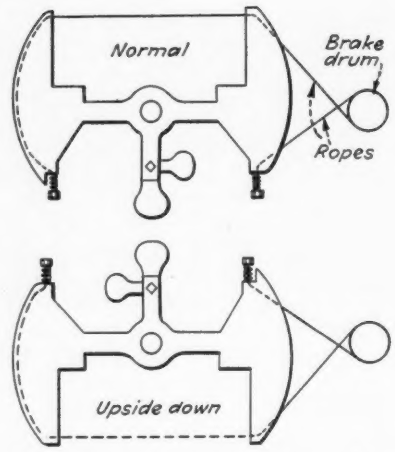


Above the lump track at the right the telescopic chute is tilted and extended to discharge onto the belt.

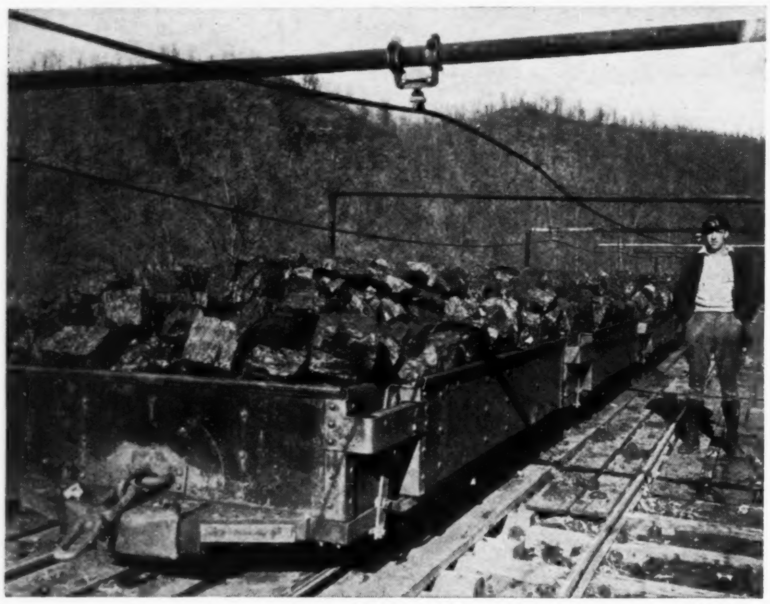
lump, 48 in.; egg, 42 in., and stove, 36 in. Belts, the Supremus brand, have five straight plies of 28-oz. duck with ⅛-in rubber on the carrying side and 1/32-in. rubber on the bottom.

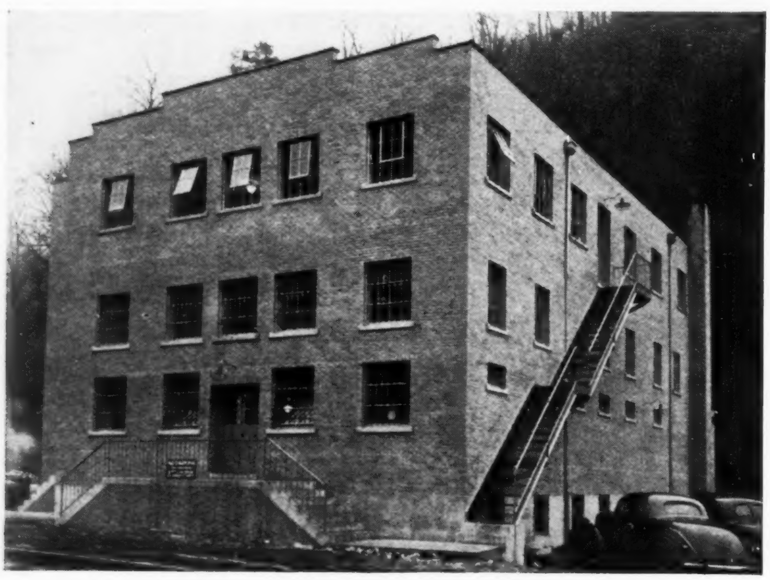
A 36-in. scraper conveyor of 66-ft. horizontal centers and 6-ft. vertical centers, and positioned above the ends of the booms and encircling a crusher, constitutes the mixing system. Coal from any of the three booms can be discharged to either top or bottom runs of the conveyor. The top run conveys to the crusher and the bottom run can be used for carrying crushed coal, nut or stove, to the egg or lump booms. This mixing is accomplished by discharging, through valves in the bottom run, to telescopic chutes which in turn place the coal onto the boom belt near its discharge end. The crusher, which was the one item supplied separately by the coal company, is a new Jeffrey 30x30-in. single-roll type.

Normally the crushed coal is returned to the rope-and-button r.o.m. conveyor and thus to the Gyrex screen by a 20-in. inclined recirculating belt of 50-ft. centers length. This belt is the Equator brand consisting of four straight plies with ⅛-in. rubber top cover and 1/32-in. bottom cover. Both troughing and return idlers are ball-bearing type. The former are style No. 553 and the latter style No. 550. Pickings from the tables are carried to a refuse bin by a chain-type conveyor 24 in. wide and 64 ft. long.



Now the rope "ring" of the dump is almost square.


Hand loaded, the new cars average 4 tons. At the right is Sherwood Sparks, mine foreman.


The new commissary and office is built to serve for the 150-year remaining life of the mine, if necessary.

The fifteen motors of the plant, all General Electric except three 4-hp. Star motors of the 3,000-lb. Electro-Lift boom hoists, are 220-volt and are new with the exception of one 50-hp. wound-rotor type driving the crusher. Six of the conveyors, including the loading booms, are driven by 3-, 5- and 10-hp. gearmotors and roller chains. The nut belt is driven by a 2-hp. motor with worm gear and chain reduction. Total connected load of the two screens and two vibrating chutes is only 18 hp. and the actual load probably not over 12 hp. On these units motors of 5 hp. are used except that the Vibrex screen has a 3-hp. motor. V-belt drive connections are used on the two screens and Reeves variable-speed drives on the vibrating chutes. The crusher drive connection is an Allis-Chalmers Tex-rope.

## Controls in Separate Room

Controls consisting of Trumbull safety switches, and General Electric magnetic starters and push-buttons are grouped in a small room opening off the screening and picking floor and commanding a view of the loading booms and mixing plant. Control buttons are arranged on a horizontal panel in positions corresponding to the starting sequence and the use of each button is labeled or explained in a framed instruction board mounted beside the panel. Wiring for both power and lighting is BX cable.

Practically all parts of the rope-and-button conveyor except the ⅞-in. rope were renewed when it was rebuilt. The mean pitch of the conveyor is 27 deg. and the maximum is 35 deg. The drive is a new General Electric 50-hp. 220-volt wound-rotor

motor which is interchangeable with the crusher motor.

One hundred of the 4-ton solid-body mine cars were purchased for the mine from the Kanawha Manufacturing Co. They are steel with wood bottoms and the dimensions are: length over bumpers, 13 ft.; width, 6 ft. 3 in., and height above rail, 32 in. Wheels are 16-in. and there is brake equipment acting on two of them. The car has a spring draw at one end and the check hook is inside of the body.

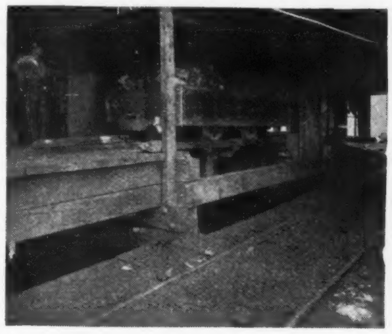
The proposed new take-off arrangement of the rope-and-button conveyor in the headhouse meant that the feeder under the dump bin would be too high to allow proper clearance between it and the end ring on which the control ropes wrapped. This dump is a gravity-operated type made by the Kanawha Manufacturing Co. In the vernacular at the mine, the problem was to "square the dump circle," meaning to slice off most of that part of the circle extending above and below the car when in normal position.

### Wire Ropes Control Dump

Two wire ropes coming off the drum ring from opposite directions and winding in corresponding opposite directions on the drum of a lever-controlled pony brake constituted the dump control. In cutting the dump ring "square" the difficulty was to work out curves and rope contact points so that both ropes would feed on and off at practically the same rates, although the rates would change at different points in the 180-deg. overturn and return of the dump.

Possibility of so changing the dump was advocated by N. W. McGuire, resident mining engineer of the coal company, and he worked out the engineering details. A sketch and several photographs accompanying this article illustrate the new arrangement. Coil springs on the rope ends where attached to the dump are indispensable features of the design. They tend to maintain proper rope tensions at change-over points and to reduce stress.

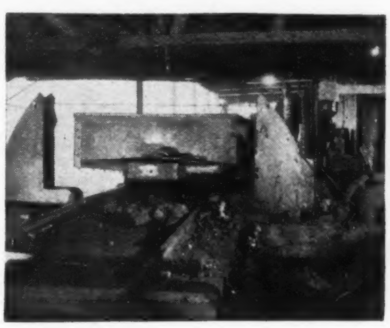
Two 300-ft. chain conveyors, one a Goodman and the other a Jeffrey, are being used for development work in a territory of 36-in. coal. Seam thickness in the old territory averaged 5 ft. and reached 6 ft. in some places. Total tonnage at present from both territories, which includes hand loading in the old works, is 450 per day. It is the plan to increase the mine output gradually to 1,000 tons in one 7-hour shift. Equipment inside of the mine, for the most part, is machinery the company has owned for some years. Cutting is done with one Jeffrey 28-A shortwall with 6-ft. bar and standard bits and with two Jeffrey 35-B shortwalls having 7-ft. bars equipped with double-point bits and special holders made by the Marathon Bit Co., Montgomery, W. Va. This type and make of bit and holder has been used for several months at three of the Carbon Fuel mines. Gathering is done with two General Electric cable-reel locomotives—one a 5-ton and the other a 6-ton—and the main haulage by one Jeffrey 10-ton. Direct current at 250 volts is supplied by a 300-kw. Westinghouse motor generator with I.T.E. automatic reclosing breakers on the d.c. side.



A load in the dump ready for the turn-over

Over she goes, but under control by means of the wire ropes.

Dump upside down. Counterweights appear in the center and on each side are the coil springs of the rope attachments.



Dumped and back to level. The control rope is 3 in. higher than the car.

At Carbon, operating headquarters of the six active mines of the company, three new buildings have just been completed, two of which replace buildings destroyed last year by fire. One is the medical and first-aid headquarters, another is the commissary and office, and the third is a clubhouse. The permanency of construction is a hint of the long life expected for the mining property (11,000 acres containing coal to last 150 years).

### Store Built of Brick

The commissary and office is a brick, steel and concrete structure 43x80 ft. with basement, two floors and a mezzanine. Except for a room in the front at one side and serving as a post office and scrip office, the main floor is taken up by the grocery, meat and department store. Most of the mezzanine floor surrounding the main store room is delegated to furniture display. On this mezzanine at the front of the room the store manager has his desk and office in a position where he commands a view of the room.

The second, or top, floor of the building, reached by a broad safety-tread outside stairway, houses the engineering, accounting and building departments and also the general operating offices, where G. K. Cabell, vice-president, and George E. Brooks, general superintendent, have headquarters. A three-story fireproof vault is built as an annex on one side of the building. Its second-story door is at mezzanine elevation and so is convenient to the store manager's office.

In direct charge at No. 3 mine are F. B. Snyder, general foreman; Sherwood Sparks, foreman, and A. V. Petitt, tipple boss. General offices of the company are in Charleston and the president is C. A. Cabell.

# 20-YEAR TRUCK MINE

## + Electrified and Specializing in Stoker

## Represents $100,000 Outlay

**• Not long ago a coal mine with no rail or water connection was just a "bank" or a "doghole," but not today. Pleasant Valley Mining Co.'s Magnolia mine, seventy miles south of Cleveland and served entirely by trucks, was developed and completely electrified, except the loading operation, for 1,000 tons output per double-shift day and an estimated life of twenty years. Domestic trade, paying cash for coal at the mine, will take about 70 per cent of the output. Stoker coal will be made a specialty at Magnolia. Rail freight rates to Cleveland from the competing No. 6 and No. 8 fields are $1.61, and $1.81 per ton, respectively.**

**By J. H. EDWARDS**
*Associate Editor, Coal Age*

HAVING proved by a smaller venture that efficiently equipped truck mines have their place in the coal industry, the Taggart interests of Massillon, Ohio, railroad mine operators of long experience, have developed a new 500-ton-per-shift truck mine 70 miles south of Cleveland. Ultimate investment in the property will reach $100,000 and the mine life is estimated as twenty years. Coal is brought out through a slope 200 ft. long on a belt conveyor which delivers from underground car dump to the tipple screens 400 ft. distant. Power is diesel-generated at the mine and all operations except loading are completely electrified. Both storage-battery and trolley locomotives are to be used for haulage.

This new property, Magnolia mine, is owned by the Pleasant Valley Mining Co., headed by F. F. Taggart, who has operated coal mines for 40 years. Early operations were in the Massillon and Middle districts of Ohio, but the largest holding is the Spruce River Coal Co., Boone County, West Virginia, which was opened 25 years ago. Present production from that property is held down to 1,000 tons daily because, in the words of Mr. Taggart, president and general manager, "we refuse to give the coal away." The Spruce River company and its officials have financial interests in the new Ohio property.

Mr. Taggart admits that he used to fight the truck mines. But in 1934 he decided to give the truck-mine business a try on an efficient scale; therefore he organized the Pleasant Valley Mining Co. and opened on Jan. 1, 1935, the Stark No. 1 mine, situated 6 miles beeline from the new Magnolia mine. Sales of 8,000 to 9,000 tons per month from the Stark No. 1 mine (in the Ohio No. 5 seam) exceeded expectation and already its 70 acres of coal has been practically depleted. Mine cars, mining machines and locomotives are being transferred from there to Magnolia.


Territory into which the coal regularly moves by truck is that inclosed by the broken line. As with other truck mines in northeastern Ohio, the general direction of coal movement is northwest.

A 700-acre block of Ohio No. 6 coal 3 ft. 10 in. thick with a 0- to 2-in. parting is under control and allotted to Magnolia mine, and more acreage is available. It is situated in Rose Township, Carroll County, and the tipple is on State Highway No. 542, an improved road leading south from the town of Magnolia, which in turn is on a paved highway 13 miles south of Canton. This 700-acre tract and adjoining property is the largest continuous or unbroken basin of mineral that has been developed in the district.

The 200-ft. slope is developed on 17 deg. and the width is 15 ft., which conveniently accommodates the belt conveyor, a walkway and a mine track for handling supplies and mine rock. From a hopper under a kick-back dump at the slope bottom the coal is fed to the belt by a Fairfield Engineering reciprocating feeder. The 24-in. Goodrich belt rides on Bartlett-Snow ball-bearing idlers. The troughing-type idlers of the top run are spaced 3 ft. and the flat type of the bottom run, 6 ft.

Driving the belt through open gearing is a 15-hp. Westinghouse 250-volt motor with Cutler-Hammer magnetic brake attached. As an additional provision against reversal of the belt if the power or drive mechanism should fail under load, a friction-set ratchet wheel is mounted directly on the head pulley shaft. Under the belt at the head pulley a rubber "blade" wipes away wet coal that tends to stick. In this belt transportation from underground dump to the tipple, Magnolia mine

needs bow to no other in the country; no size exceptions made.

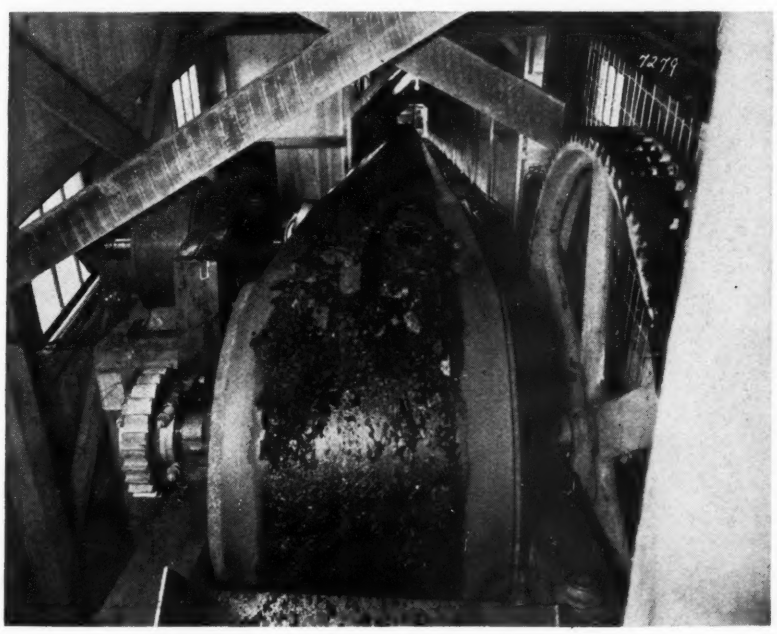
Tipple preparation equipment consists of a combination shaker unit serving as primary screen, picking table and transfer chute; a vibrating screen to prepare $1\frac{1}{4}$x$\frac{3}{8}$-in. stoker coal, and a 12-in. belt 15 ft. long to convey this stoker coal to its bin. The shaker unit, which is 60 ft. long, extends over the tops of three circular wood-stave-type 100-ton bins supported on steel beams. The vibrating screen is positioned directly below the primary screen and the $\frac{3}{8}$x0-in. slack, which goes through the vibrator, drops directly into the first bin. Lump and stoker bins have spiral lowering chutes. The shaker unit is a two-section balanced-type hung on springboards and it was locally built except that eccentrics and drives were furnished by the La-Del company. Spiral chutes were built by Robert Holmes Bros. and the vibrating screen by the Deister Concentrator Co.

This balanced shaker unit, 60 ft. long, acts as primary screen, picking table and transfer chute.

At the head of a trestle leading up from the mine portal and connected to the tipple are a hoist house, car dump and bin where mine rock is dumped for loading into a motor truck for disposal. This equipment was used in driving the slope and then for bringing out the coal from the bottom development prior to completion of the belt conveyor. The hoist is a single-drum type driven by a 10-hp. motor.

Power for the mine is generated by a 150-hp. three-cylinder 14x17-in. Fairbanks-Morse diesel engine direct-connected to a 100-kw. 400-amp. 250-volt Allis-Chalmers d.c. generator operating at 270 r.p.m. To furnish the electric power for lighting and pumping when the 100-kw. machine is shut down there is a Merriman emergency unit consisting of a Studebaker Big-6 gasoline engine direct-connected to a General Electric 20-kw. generator. These power-plant units were purchased rebuilt.

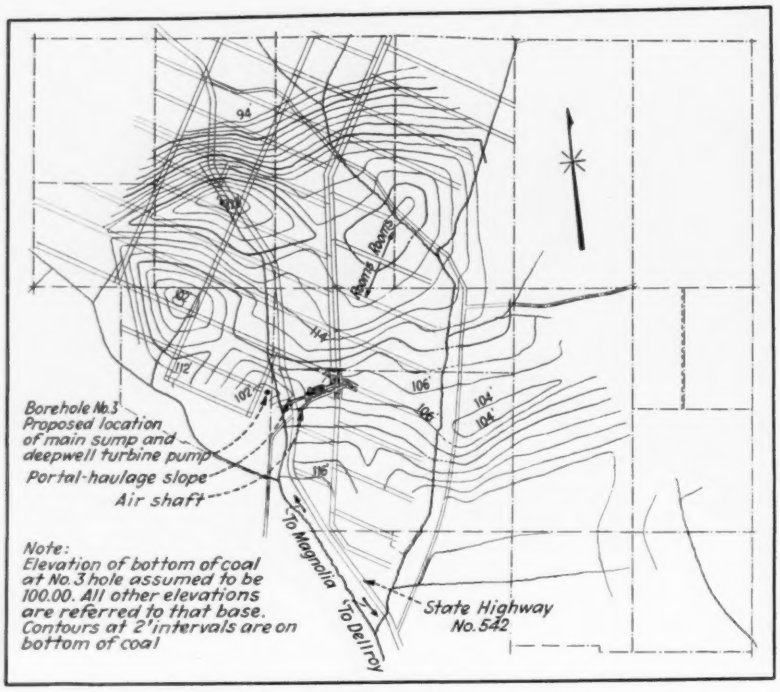
A closed system of water cooling is used for the diesel engine. This water is circulated through pipes set in an outside sump through which water pumped from the mine is wasted to the creek. A 2,800-gal. tank elevated 10 ft. above the engine heads, and through which the water passes on its way to the cooling coils in the sump, contains the reserve. The power house is built of tile and connected thereto is a steel building which houses a supply room and a space which can be used for repairing track-mounted mining equipment and as a garage for the refuse-disposal truck.



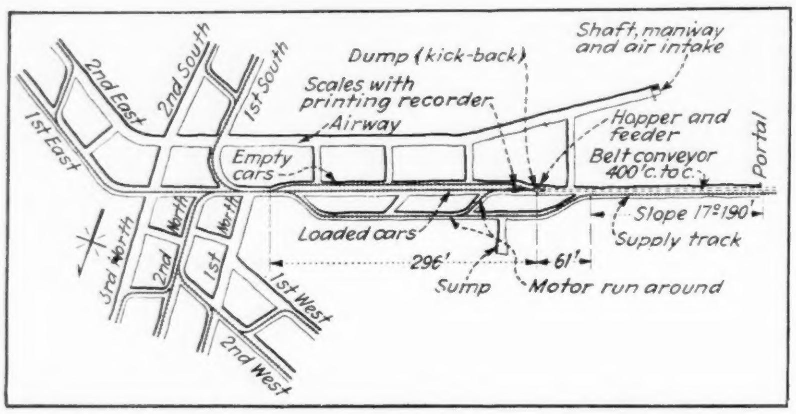

Head end of the slope belt at Magnolia. In addition to a magnetic brake the non-return protection includes the ratchet at the left.

Underground workings up to the time of this writing consisted of development only. Headings are driven 12 ft. wide on 50-ft. centers and the plan calls for rooms 24 ft. wide on 36-ft. centers and 200 ft. deep. All headings and rooms are driven on sights, a practice which is unusual for a large majority of the mines in the district. The seam thickness ranges from 36 to 48 in. and the top is a gray slate which is fairly firm. A clay bottom makes it improbable that much of the coal of the 12-ft. room pillars can be mined. Cover over the property ranges from 50 to 200 ft. By studying elevations obtained from 40 test holes the probable contours of the coal were shown on the map by contour lines at elevation intervals of 2 ft.

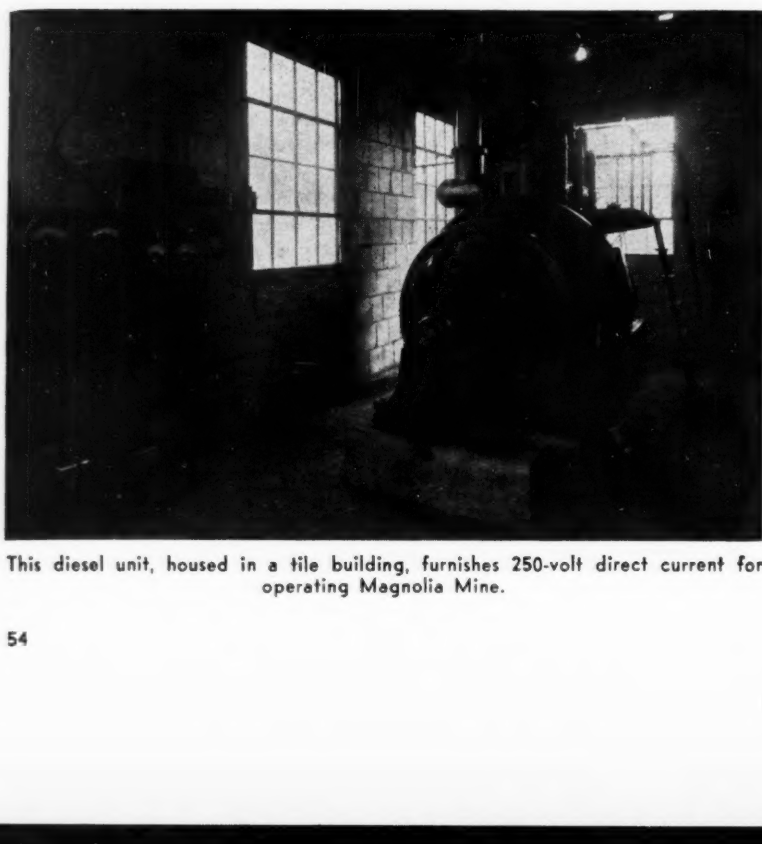
Channel samples from the mine show proximate analyses within the usual range for that seam, which is known in broader terms as the Middle Kittanning. An analysis picked as typical shows: moisture, 4.85 per cent; volatile, 40.70; fixed




The main entry consists of three headings and, as projected, they run north 2,300 ft. then angle to the east.



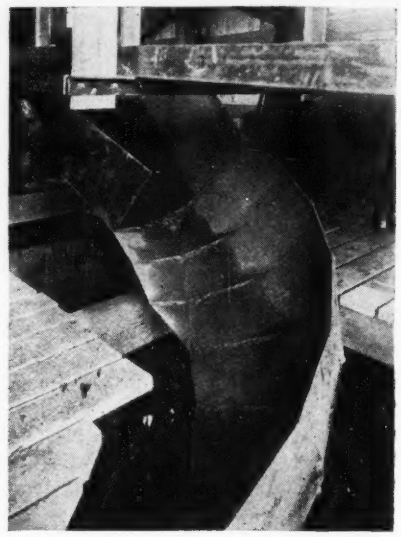

Bottom layout and development at Magnolia mine as of Feb. 1, 1939.



This diesel unit, housed in a tile building, furnishes 250-volt direct current for operating Magnolia Mine.

carbon, 47.45; ash, 7.00; and sulphur, 2.6 per cent. British thermal units for that sample were reported as 13,565 and the ash fusion as 2,210 deg. F.

At the time of this writing the coal was being undercut with a Goodman Type 12AA shortwall, holes being drilled with a Cincinnati electric drill and the shooting done with Austin pellet powder ignited by Austin Beaver brand fuse. Two shots are placed in a 12-ft. heading and the holes for these are started 18 in. from the top and then sloped upward. The development work was being double-shifted and the coal production was 45 to 50 tons per shift.



A spiral chute eases the lump down into the bin. Stoker coal is handled the same way.

The following equipment, to be released when Stark No. 1 mine is completed, will be available for transfer to Magnolia: two Jeffrey 35BB shortwalls, one Morgan-Gardner 5-ton trolley locomotive, one Goodman 3-ton trolley locomotive, two Ironton locomotives equipped with Edison batteries, and 70 wooden cars of 1½ tons capacity of which part have plain bearings and part have roller bearings. Most of these items of machinery except the mine cars, which were new, were sent to Ohio from the Spruce River mines in West Virginia. Forty-pound rails are installed on the mine bottom and it is the plan to continue this size on the mains and to use 20-lb. in butt headings and in rooms.

Drainage equipment regularly discharging to the surface through the main slope consists of a Deming-Mueller 2-in. centrifugal pump installed at a sump 4 ft. deep, 10 ft.

The heading has been undercut, the drill is being taken down and the holes are about to be loaded. In this heading the coal reaches a thickness of 4 ft.

Standing beside the car at the dump is W. G. Fiddler, night foreman. Near the scale, equipped with a recorder, J. G. Richards, general inside foreman, checks his time book.

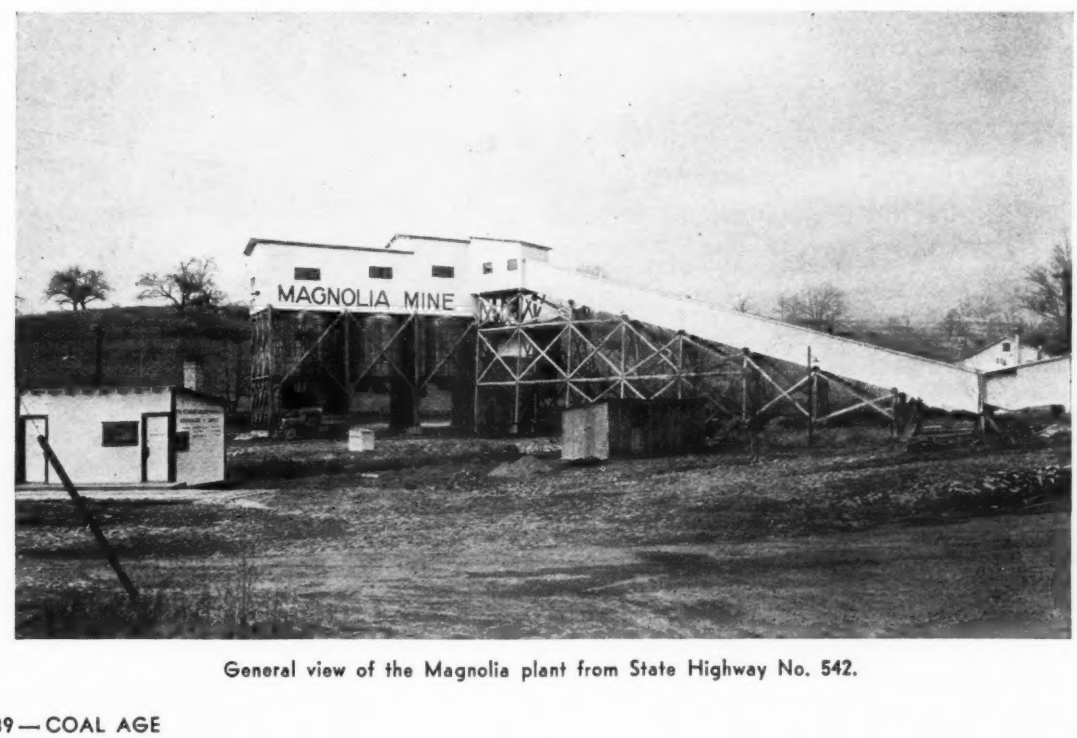
wide, and 35 ft. long driven at right angles to the run-around at the slope bottom. Other pumps now installed inside are a Goulds piston-type, a Deming 5x5 Oil-Rite and a diaphragm pump. At a low point in the basin, situated 250 ft. straight-line from the slope portal but 1,500 ft. underground-travel along the entries as projected, it is proposed to install a deepwell turbine pump and drain a large part of the mine to that point.

Several safety features unusual for the district are made compulsory in the mine. These include electric cap lamps (Edison), systematic timbering, safety shoes or boots for all employees, goggles when performing work dangerous to eyes, and safety hats for employees working underground. The workmen are members of the United Mine Workers and the rate for drilling, loading and shooting is $0.783 per ton. Day men are paid $4.40 to $7.15. It is probable that the mine payroll will grow to include 150 men.

Based on experience at Stark No. 1 mine, 70 per cent of the tonnage from Magnolia will be sold to the domestic trade, which pays cash at the mine. A difference is that stoker coal will be made a specialty at Magnolia. The season of mine operation will extend from Aug. 1 to May 1. The minus-⅜-in. coal will go principally to industries and be sold through the Taggart Coal Co.

According to Mr. Taggart, "80 miles is the approximate economic meeting point of truck and railroad shipments." The farthest that coal moves regularly by truck from the Pleasant Valley mines is to Vermilion, on the lake between Lorain and Sandusky, which is slightly more than 80 miles. The competing freight rates to Cleveland are $1.61 from the No. 6 field (centering at New Philadelphia) and $1.81 from the No. 8 field (counties bordering on the Ohio River near Steubenville).

Land surveys, mine layout and plant design were handled by Clyde Augsburger, civil and mining engineer, of Canton. He is vice-president of the Pleasant Valley Mining Co. and is in direct charge of the operation.




General view of the Magnolia plant from State Highway No. 542.

# *Notes . . .* FROM ACROSS THE SEA

A NEW IDEA is forcing its way on the consideration of the coal industry: That there are rock dusts and rock dusts. Fineness, freedom from combustible matter and from soluble silica once held the field; today, presence of combined moisture, carbon dioxide, dispersibility (as influenced by absorption of water and by shape of particle) and color have all been added, and coating substances and mixtures to render the dust more ready to rise and prepare itself for action are being considered.

In a paper presented by F. V. Tideswell and R. V. Wheeler before the Midland Institute of Mining Engineers at Leeds University, the authors say: "When a layer of coal dust was laid on top of stone dust [on shelves in the underground roadway at the Buxton Experiment Station], it was raised before the stone dust and thus extended the inflammation; this appeared to be due not to any markedly greater dispersibility of the coal dust but to the greater opportunity of the uppermost layer of dust to be dispersed by the blast of the explosion."

Within 100 ft. of the source of ignition of a mild explosion, only the surface layer of dust usually is disturbed, but, as the blast of air increases in velocity as it nears the open end of the gallery, most of the dust is raised regardless of its nature. Contrary to expectation, the coal dust was not the most readily dispersed of the dusts tested.

It was found that one deposit may be completely swept away and yet a similar near-by deposit may be eroded only slightly. To Messrs. Tideswell and Wheeler it seemed that this was because erosion became more rapid when once the surface of the dust had been disturbed.

Perhaps, as the authors suggested, the type of mill in which the dust is ground influences its dispersibility, as will be noted in the illustration. The ball-mill dust, supplied in 1934, had 82 per cent going through a 240 British Standard screen; the tube-mill dust, supplied in 1938, had 76 per cent, and the Raymond mill dust supplied in the same year 68 per cent, both passing through a 240 British Standard screen.

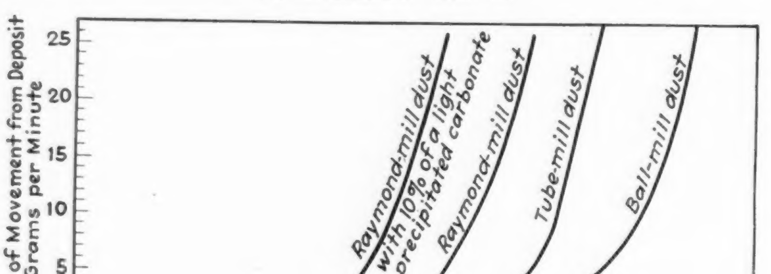
### Explosion Prevention

**A British coal-mining company puts a bag of rock dust on every cutting machine ready to be thrown on any methane ignition caused by sparks emitted on cutting into pyrite or sandstone. Another keeps permits in the rescue room. Only those with permits duly issued can go below ground in case of disaster.**

**Rough dust, declares R. V. Wheeler, is more readily dispersible than the finer dust. Zones of quiet with no disturbance at all occur along the line of a coal-dust explosion at points where contrary vibrations cancel each other. Adding limestone dust to shale dust does not improve the latter, but adding 20 per cent or more of shale dust to limestone dust does. Some substances suppress explosions by chemical action and are five or more times as inhibitive as limestone. Within certain limits of saturation they can be rendered nearly as dispersible as coal dust.**

Ground dolomitic limestone when fresh, had a dispersibility of 20, but when mixed with 10 per cent of light precipitated carbonate it had twice that dispersibility. When weathered, the unmixed dolomitic limestone dust had a dispersibility of fifteen and when weathered the mixture with light precipitated carbonate had a dispersibility of 40. In each instance, the portable bellows test was used. With the rose-jet test, the quantity moved was in the same order but the differences were not quite so striking.

Rates at which a dolomitic limestone ground in different mills and a dust mixed with precipitated carbonate will be dispersed with different air speeds. Finest dust did not give best result, perhaps because fine dust packs too closely and the air does not "ravel" it.




The most effective substance for increasing the dispersibility of rock dust that the investigators had found to date was carbon black. One may wonder if finely ground anthracite might not do as well. With one form of carbon black the results given in the table were obtained. Apparently the increase in effect tends to be less pronounced as more carbon black is used.

**Mixing Carbon Black With Inert Dust Increases Rock-Dust Dispersibility**

| | Gypsum | Limestone |
|---|---|---|
| | Speed of Air Over Dust, Ft. per Minute | |
| Additions | | |
| None | 3,400 | 3,200 |
| ½ per cent carbon black | 2,500 | 2,700 |
| 1 per cent carbon black | 2,100 | —— |

Apparently it was discovered concurrently in Great Britain and the United States that as little as ½ per cent of palmitic or stearic acid will make rock dust repel water. It would be interesting to know if it is then as dielectric as ever, for when spread over trolley hangers the dust should not conduct electricity, as it will if the dust has absorbed water. All ordinary dusts when placed on a dampened clay plate will become damp within half an hour, but the two waterproofed dusts (both ground limestone) remained readily dispersible for a month. Thus they were as resistant to damp as some coal dusts and more resistant than others. The fatty acid is cheap, readily available and is added when milling. It will repel damp also from the precipitated carbonates if used to increase dispersibility. The effect on health is another matter as to which the deponents say nothing.

In discussion Dr. Tideswell declared that palmitic and stearic acids formed a large proportion of most common fats and were not injurious to health. They could be applied to the surface of shale dust as well as to that of limestone dust. The powder with which he had made his demonstration contained only ½ per cent of palmitic acid. The quantity used would add about 12c. per ton to the cost of the dust treated. Even if the mine water contained ammonium chloride, it would not wet the treated powder. Treatment of common salt with the fatty acids also has been studied, but serious difficulties remain to be overcome. (Dry salt was mentioned because it is an excellent explosion deterrent.) The finer a dust the less easily it is dispersed and the less resistant it is to deterioration.

With Professor Atkinson, Dr. Tideswell thought that the shape of the particles produced might have an important bearing on the dispersibilities of the dusts, but a more likely explanation might be found in the proportion of very fine particles present. The Raymond mill dust without light precipitated carbonate shown in the chart was an air-blown powder, and the size analysis of the dust showed that it contained only half as much very fine dust—say below 20 microns—as was found in the less dispersible dust from the tube mill. In his belief, the best treatment for the floor of a mine roadway was consolidation of the dust with the aid of a wetting and a

hygroscopic agent, leaving sides and roof to be treated with rock dust. The firmly bound floor thus obtained was more easily kept free from a further accumulation of coal dust than would be a loose, dusty floor.

(The undersigned learns that single-pressed stearic acid in finely divided form has been used in the cement industry for waterproofing purposes, and the use of oleic acid for this purpose also has been patented. One manufacturer of stearic acid states that: "It is our understanding that the stearic acid is mixed with the cement dust during the process of grinding so that lime stearate or oleate is formed in place, the resulting lime being repellent. Apparently the same process could be used with rock dust, there being enough lime in the rock dust to produce lime soaps with the fatty acids.

"The cheapest grade of stearic acid is the so-called single-pressed, which is obtainable at the present time in carload lots of 30,000 lb. minimum at 10c. per pound delivered. Ton lots sell at $10\frac{1}{2}$c. and less than ton lots at 11c." Oleic acid, he adds, which in carloads costs 7c. per pound, in ton lots $7\frac{1}{2}$c., and in less than ton lots 8c. delivered, drums returnable, apparently is not entirely satisfactory. Another company says the double-pressed grade costs $\frac{1}{2}$c. more. A third authority declares that stearic acid in commerce usually contains palmitic acid.)

R. Dawson Hall

# *On the*
# ENGINEER'S BOOK SHELF

*Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case are in the review notice.*

*Dewatering and Drying of Coal, by J. R. Cudworth and Ellis S. Hertzog, U. S. Bureau of Mines. I. C. 7009; 31 pp.; mimeograph.*

This information circular reviews the progress of dewatering and its importance, but has little or nothing to say as to thickeners or classifiers. Surface moisture is said to consist of adsorbed water, which is perhaps merely of molecular thickness, absorbed water that is held on the adsorbed water by adhesion and surface tension, macrocapillary water, interstitial capillary water and inherent, or microcapillary, water. Carpenter, Elmore, Hoyle, Reineveld, Wedag and Altpeter Gutchöffnungshütte centrifuges are described. Filters are briefly treated, with heat-drying at greater length. Costs per ton of coal discharged and the advanced practice in Pennsylvania, Illinois and Ohio are briefly recorded.

*Report of the Committee on the Firedamp Detector Regulations, Mines Department. British Library of Information, New York. 53 pp.; paper. Price, 35c.*

This report, which discusses many—not all—of the pros and cons of the use of detectors, recommends that "the competent workman appointed to carry a detector should not be provided with any other lamp unless he makes representation to the manager and receives written permission from him to carry an electric lamp also"; that "no lower proportion than one detector (whether automatic, non-automatic or with the two types used together) for every eight men employed should be allowed on such (longwall) faces"; that "a firedamp detector be provided to every set of workmen engaged on repair work in return airways"; that "a detector be provided in every working place at the coal face and in any stone drift or heading in course of being driven"; that "no workman shall be certified as competent unless he has shown his ability to estimate gas caps seen on the actual flame of a safety lamp whether in a gas chamber or otherwise."

*Relation of Dust Dissemination to Water Flow Through Rock Drills, by C. E. Brown and H. H. Schrenk. U. S. Bureau of Mines. R. I. 3393; 6 pp., 4 full-page plates; mimeograph.*

The more water used with rock drills, the less dust, was the finding made at the Anaconda Copper Mining Co.'s mines, both with drifters and stopers. There were no exceptions. Only in three cases within the limits of test did the determinations tend to show that at higher flows a limit would be reached to the effectiveness of adding more water, but the reviewer would be disposed to believe that somewhere there may be a practical limit to the effectiveness of water.

*Some Observations on Coal-Mine Fans and Coal-Mine Ventilation, by D. Harrington and E. H. Denny, U. S. Bureau of Mines. I. C. 7032; 20 pp.; mimeograph.*

This publication summarizes the regulations regarding ventilation of mines in the public domain, Pennsylvania and Colorado, which regulations have been amended recently. In the public domain, the main fan must be placed on the surface and situated not less than 25 ft. clear of the extension of the mine opening. The fan must be protected by explosion-relief doors of area equal to that of the airshaft or airway and in a direct line therewith. Other rules require quick fan reversal, withdrawal of men on fan failure, operation of fan for specified periods before men, other than mine examiners, enter the mine; continuous ventilation pressure record, automatic signal to warn of fan slowing or stopping and an incombustible fan house. At gassy mines, electrically driven fans must have permissible motors with auxiliary power connection. Some of the rules do not apply to small mines and may be waived by written consent of the district mining supervisor. The circular ends with 32 safety recommendations for safeguarding ventilation.

*Washability Characteristics of Illinois Coal Screenings, by D. R. Mitchell and L. C. McCabe, Illinois State Geological Survey, Urbana, Ill. R. I. 48; 84 pp.; paper.*

Screenings representing five beds and a variety of operating conditions were sampled at ten Illinois mines. The best specific gravity for separating most of the coals for ash and sulphur reduction, recoveries and ease of washing was found to be 1.50, though one coal desirably might be washed at a higher specific gravity. Recoveries varied from 80.6 to 92.6 per cent; ash in cleaned $1\frac{1}{4}$-in.x48-mesh coal ranged from 5.0 to 11.8 per cent, yet raw screenings had from 10.8 to 19.7 per cent ash.

*Advanced Mine Rescue Training Course of the Bureau of Mines, by J. J. Forbes. U. S. Bureau of Mines. I. C. 7010; 10 pp.; mimeograph.*

A record of the introduction of self-contained breathing apparatus and a description of the subjects taught in the mine-rescue training course, with the reasons for establishing the course and some further details as to the nature of the training.

*Transactions of the First Annual Anthracite Conference of Lehigh University. Lehigh University, Bethlehem, Pa. 187 pp.; paper. Price, $1.*

These transactions and the discussions thereunto pertaining have been noted in *Coal Age*, June, 1938, pp. 72-74.

*The Leicestershire and South Derbyshire Coal Field, South Derbyshire Area, the Stockings Seam. Fuel Research Bulletin No. 43. British Library of Information, New York. 69 pp.; paper. Price, 65c.*

Though the Leicestershire and South Derbyshire coal field has been mined since 1204 A. D. (735 years), and covers only 76 square miles, it is still in operation. Main coal runs from $13\frac{1}{2}$ to $21\frac{1}{2}$ ft. in thickness; Stockings seam is 5 ft. $9\frac{1}{2}$ in. thick. In the bulletin, proximate and ultimate analyses are given for all five benches of the seam as mined in eight several areas; also calorific values, fusion points of ash on initial deformation and on actual fusion with appearance of resulting clinkers. Other determinations are phosphorus, chlorine—the latter water-soluble and insoluble—carbon dioxide with carbonization results at 600 deg. C. Vitrain analyses are given for each of the eight areas, but no analyses of the several components of the ash.

# OPERATING IDEAS

## From

## Production, Electrical and Mechanical Men

### Dump Rails Raised by Strips To Prevent Car Derailments

Using a single crossover dump, considerable difficulty was encountered at the mine of the Reid Coal Co., Timblin, Pa., from derailments of cars due to coal sticking on the 60-lb. dump rails employed, writes James Thompson, foreman. When cars were dumped and then pushed off by the next load, they frequently were thrown off the rails by lumps of coal which lodged on rail surfaces, about 3 in. broad.

The remedy adopted was welding strips of ½-in. square iron equal in length to the dump rails to the tops of these rails. The strips were beveled at each end to permit the cars to go on and come off with ease, and were placed on the gage side. The object was to provide a narrow, bladelike track on top of the regular rails so that lumps could find no lodging place. Some small pieces still stick to the tops of the rails, but these are squeezed off by the car wheels without trouble. Derailments of cars leaving the dump have been eliminated entirely, Mr. Thompson states.

### Building for Permanence Saves Future Dollars

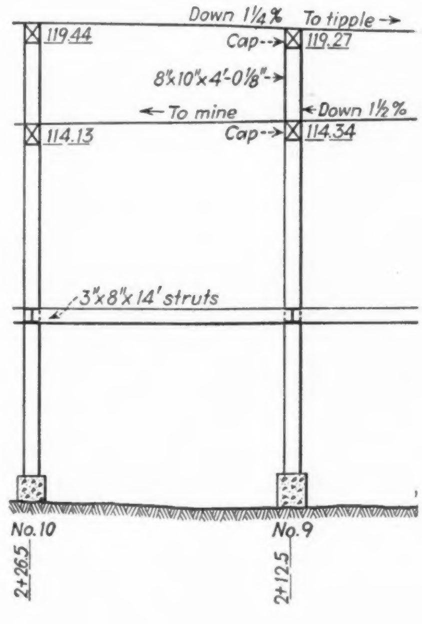
With few repairs and only a small cost for maintenance, "the trestle at our Mine No. 6 has withstood the constant strain of coal tramming for more than eighteen years," writes E. A. Smith, chief engineer, Central Elkhorn Coal Co., Estill, Ky. The trestle was built of long-leaf yellow pine. Width is 20 ft. and the average height to the first deck is 22 ft. The length is 850 ft. The width is sufficient for both empty and loaded tracks, each of which is arranged for gravity movement of cars onto and off the tipple, respectively.

No wood preservatives have been used in the trestle, with the exception of a little roofing tar, which was brushed on the ends of all timbers and on all surfaces in contact with braces or struts. This was done when the trestle was built. Small pieces of roofing were placed on the tops of all posts to prevent the entrance of moisture and consequent decay.

Permanent lateral bracing was duly provided by double-purpose batter posts, which also serve as a support for the center of the trestle floor. A trestle of this height and life poses quite a problem from the standpoint of permanent effective bracing. These center posts, shown diagrammatically in Fig. 2, "have proved their worth in every way. They did not quickly decay, as would the smaller-sized bracing." However, some of the smaller-sized bracing was, of course, necessary in building the trestle, and much of this has had to be replaced. "We used 3x8-in. materal for the X-bracing and also for decking. Some of this bracing was as long as 22 ft. All of this 3x8-in. material, however, was surfaced on all four sides against the growth of fungi and consequent decay."

Another precaution was leaving a 1-in.-wide open space between each board in the decking. This permits falling water to drain away quickly and lets fine coal and dirt drop through out of the way. Caps were extended beyond their respective bearings as an additional protection against the attacks of the elements. These extensions also serve to further support the X-bracing, as well as carrying the trolley-wire posts and the posts for the railings.

Fig. 1—Side elevation of trestle.



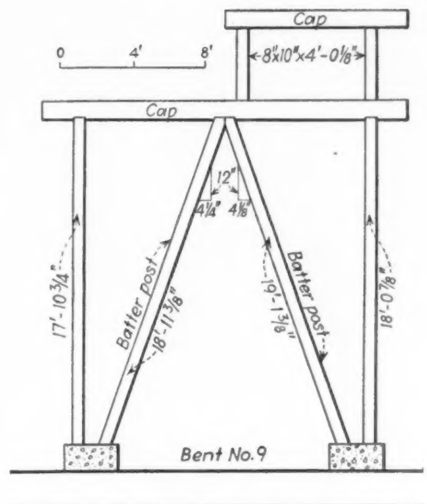
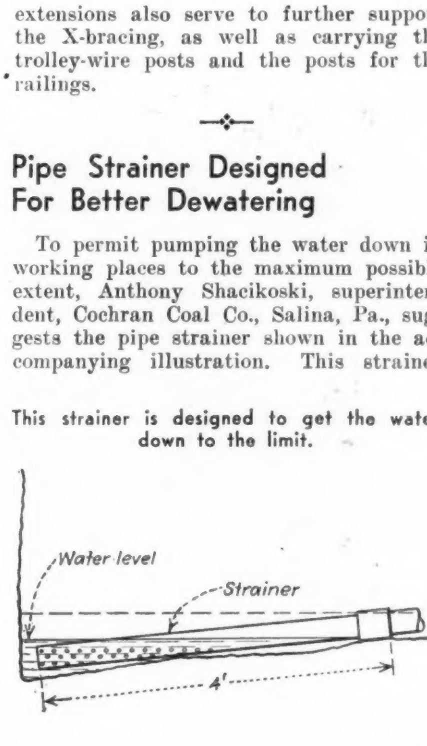




Fig. 2—Showing use of batter posts as permanent lateral bracing and also as a support for the center of the trestle deck.

### Pipe Strainer Designed For Better Dewatering

To permit pumping the water down in working places to the maximum possible extent, Anthony Shacikoski, superintendent, Cochran Coal Co., Salina, Pa., suggests the pipe strainer shown in the accompanying illustration. This strainer

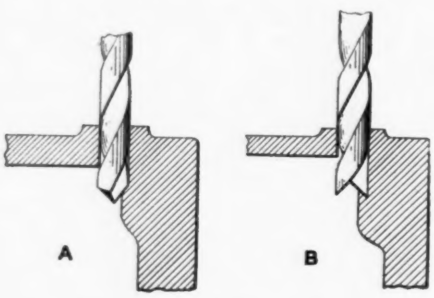
This strainer is designed to get the water down to the limit.



consists of a piece of pipe about 4 ft. long, which is drilled with holes on the lower side of one end about as shown in the sketch. With the holes on the bottom, says Mr. Shacikoski, there is less chance of fine coal or other material plugging the strainer and, furthermore, it is possible to get the water down about as low as possible before the line begins to suck air. And if a small hole is dug in the bottom, the place may be pumped practically dry. This type of strainer also is adaptable to being inserted in the undercut before the coal is shot down, which frequently is an advantage.

## Drilling Shouldered Castings

Often the task of drilling a hole in some casting, writes Charles H. Willey, Penacook, N. H., is impeded by the drill point striking a shoulder as shown at *A* in the sketches, with the resultant breakage of the drill if one is not extremely careful.




Bit types for drilling castings.

When such a problem arises it is well to drill the hole part way and then grind a drill to a vee mouth, as shown at *B*, for finishing the job. By this method the work can be done safely and correctly, without any danger of breakage or misalignment of the drilled hole.

## Won't Wait

**• Most problems around a coal mine have a habit of popping up without warning and a solution generally can't be postponed without cost or tonnage suffering. So operating, electrical, mechanical and safety men must possess or acquire the ability to think and act quickly. In this respect, the experience of others often can be a help. The object of the Operating Ideas pages, therefore, is to present selected examples of this experience, and to that end we solicit your assistance. If you've been through the mill and have come out with a good answer to some problem, here is the place to pass it on to another man who may run into the same thing some future day. So send in your ideas, along with sketches or photographs if they will help make them clearer. For each acceptable idea, Coal Age pays $5 or more to the man who submitted it.**

## Steel Tube Used for Slope At Belleville Valley Mine

Riveted steel tubing 12 ft. in diameter was installed to make the slope opening at the new Belleville Valley mine of Stiehl Bros., Belleville, Ill. At this mine the cover over the coal at the point the slope was sunk is 80 ft., and the steel tubing was used for that part of the slope extending down to the bedrock over the coal. Inclination of the slope is 17 deg., and the excavation for the tube was made with a shovel. When the open cut was completed, the tubing was rolled into place and joined, making an economical, fireproof and water tight installation. As can be seen in the accompanying illustration, the installation was completed by the construction of a fan shaft, while the bottom part of the tubing was filled as a base for the track.

"We believe our idea is brand new," said C. G. Stiehl, one of the brothers, in commenting on the installation. "At least it was our own idea, and it worked out to a nicety. The same method can be used at any point where the coal is not too deep."

Mouth of steel-tube slope at Belleville Valley mine, with fan at left.

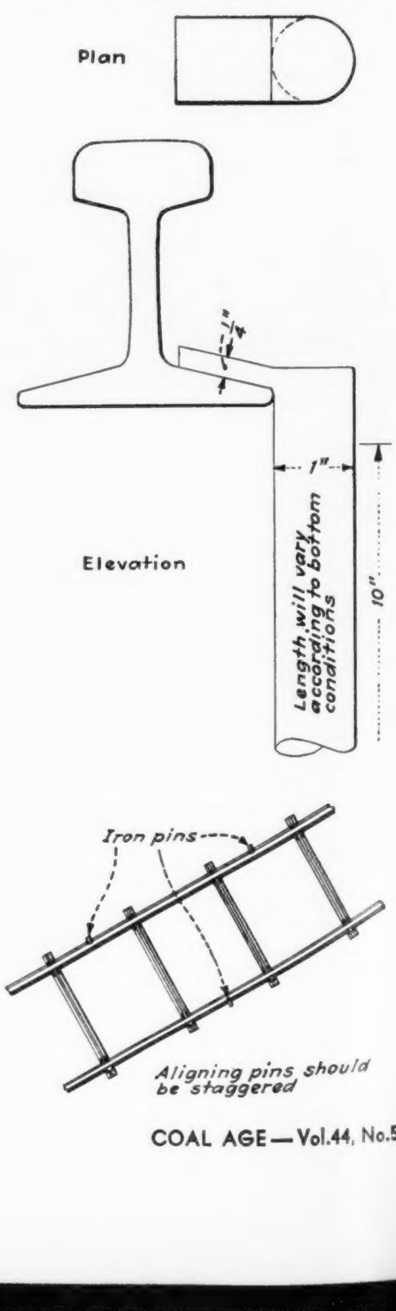
*Brinkman—from Globe*

## Maintaining Track Alignment

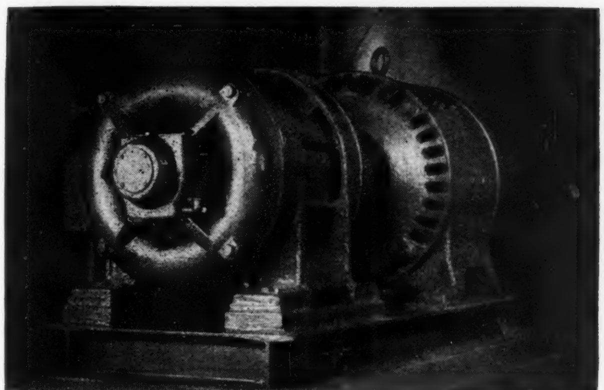
"For rapid and efficient haulage it is necessary to have good track; and one of the requisites of good track is that it be on line," states J. Peraino, of Inland Steel Co., Wheelwright, Ky. Haulage in butt entries, as well as in mains, is important to efficient operation and should not be overlooked, as is so often the case.

Considering haulage on other than the main roads, the sketch illustrates a very simple and practical means of maintaining the alignment of track, especially on steel ties. Steel ties promote rapid and inexpensive tracklaying, but such track is soon thrown out of line by heavy haul-

Iron pins for maintaining track alignment.



# THE RIGHT LUBRICANT PROPERLY APPLIED REDUCES COSTS FOR THESE MANUFACTURERS



## STANOIL

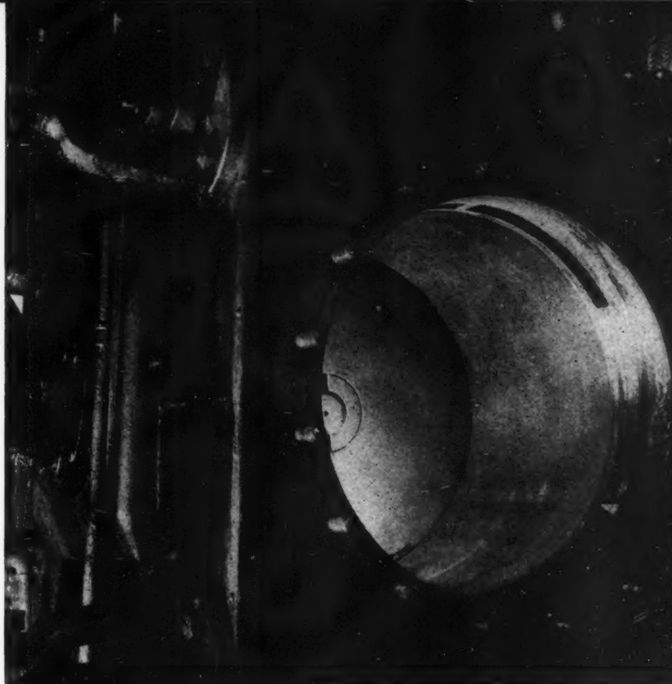
A motor generator set was burning out bearings because of sudden weather changes, even though summer and winter oils were used. The chief electrician found that one grade of Stanoil used the year 'round stopped weather guessing, ended bearing troubles.

## SUPERLA GREASE

A conveyor manufacturer thoroughly tested several brands of grease before entrusting the roll bearings to the protection of Superla Grease. The higher viscosity oils in Superla and its freedom from separation even after long periods of service were some of the deciding factors in favor of Superla.

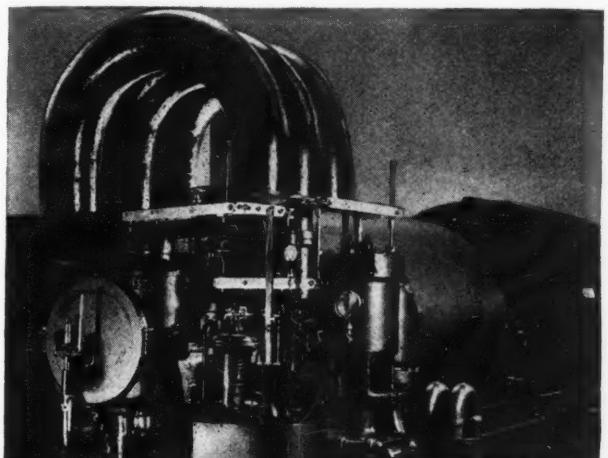
## NEW DEVELOPMENT IN LUBRICATION

A booklet describing the latest development in lubrication is just off the press. A development that enables you to use one brand of oil to replace up to 27 specialized brands now in use *and do a better lubricating job.* Find out what this new idea might mean to you in reduced lubricating and maintenance costs. Ask for the booklet "Spare the Time to Spare Your Machine." Write Standard Oil Company (Indiana) 910 South Michigan Avenue, Chicago, Illinois.



## STANOCYL

The superintendent of an industrial power plant could not get his Corliss engine to pull its rated load. Examining the cylinder he found it scored and dry although ample oil had been fed to the engine. A Standard Lubrication Engineer recommended StanoCyl W, an oil for use under wet steam conditions. Now the engine pulls a full load and there's no more scoring.



## NONPAREIL TURBINE OIL

Governor driving gears on a turbine in a southern public service company power plant were being replaced every 6 to 8 months. In an attempt to overcome the difficulty Nonpareil Turbine Oil was installed. That was 6 years ago. A recent inspection showed this 6-year-old set of gears to be in perfect condition. The same fill of turbine oil is still in use.


Standard Lubrication Engineers are located in 29 offices throughout the middle west. There is one near your plant ready to help you with any lubrication problem and to help you get more for your lubrication dollar. This service is free if your plant is in any of the 13 states shown above. WRITE STANDARD OIL COMPANY (INDIANA) 910 S. MICHIGAN AVE., CHICAGO, ILL. for the Engineer nearest you.

# STANDARD OIL COMPANY (INDIANA)

...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRI

age, unless some form of anchorage is used. Iron pins maintain track alignment on steel ties if they are set staggered on 6-ft. centers or more, alternating against the base of the rails, and in the bottom 6 to 10 in., depending on conditions.

Holes for the steel pins can be conveniently sunk at the same time the trolley-wire hanger holes are being drilled. Expense of the pins will be well repaid by increased haulage speed and by the labor saved in straightening track after it has become misaligned.

Iron pins can be used also with track on wooden ties where ballasting is insufficient to maintain the alignment. In this case straight pins can be placed against the ends of the ties.

In some cases where it is difficult to keep track on line, timbers are placed against the track and rib. When pins are used, it is possible to keep a clear, and consequently a safer, roadway.

## Arc-Welded Man Cages Used In Lining Large Borehole

The field of arc welding in mine drainage includes not only the repair of pumping equipment but also the construction of other dewatering facilities and auxiliaries, such as drill bits, column lines, etc., states Paul F. Erch, mechanical draftsman, Glen Alden Coal Co., Scranton, Pa., in a paper receiving honorable mention in the $200,000 Award Program sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio (October, 1938, *Coal Age*, p. 90). As an example, it is necessary, of course, that a mine pump have a discharge line, commonly known as a column pipe or column line, which may be installed in one of the shaft compartments or laid in a slope. In other applications, the pipe may be installed in a borehole which may be driven downward, upward, horizontally or at any angle.

Churn drills generally are used in putting the larger holes down from the surface, but for other conditions it is necessary to use a rotating drill. Some rotating drills are of the diamond type. Others use hard chilled shot as a cutting medium and still others a cutter studded with small hard particles, or points, of such material as "Stellite," "Carboloy" or "Borium," applied by arc welding. Some of these boring bits are equipped with teeth shaped somewhat like rip-saw teeth. These teeth are given a hard surface by arc welding on the materials mentioned above. Even in the case of the churn drill, this practice sometimes is followed to lengthen the life of the cutting edge. The difference in investment in tools growing out of the use of welded cutters as against diamond-studded cutters can run into thousands of dollars. And $100 worth of diamonds can be lost very easily.

"When a hole has been drilled it often is necessary or advisable to line, or case, it with some kind of pipe, which usually is concreted or grouted in place. This is done where the hole is driven through intervening beds of coal or through caved or otherwise broken ground. Various kinds of pipe have been used for this purpose, with steel the most common. Formerly this was joined together as it was lowered into the hole by screwed-on sleeves, which wasted considerable of the costly borehole space and decreased the possible water-carrying capacity of the hole or else increased its friction head. The sleeves also interfered somewhat with the proper placing and distribution of the grouting material. These difficulties have been overcome by arc welding the successive lengths of pipe together as they are lowered into the hole. By thus drilling a smaller borehole for a given inside diameter of steel lining pipe a saving of $800 to $1,500 might be made in a typical case.

Fig. 1—Man-cage combination used in placing the pipe sections.

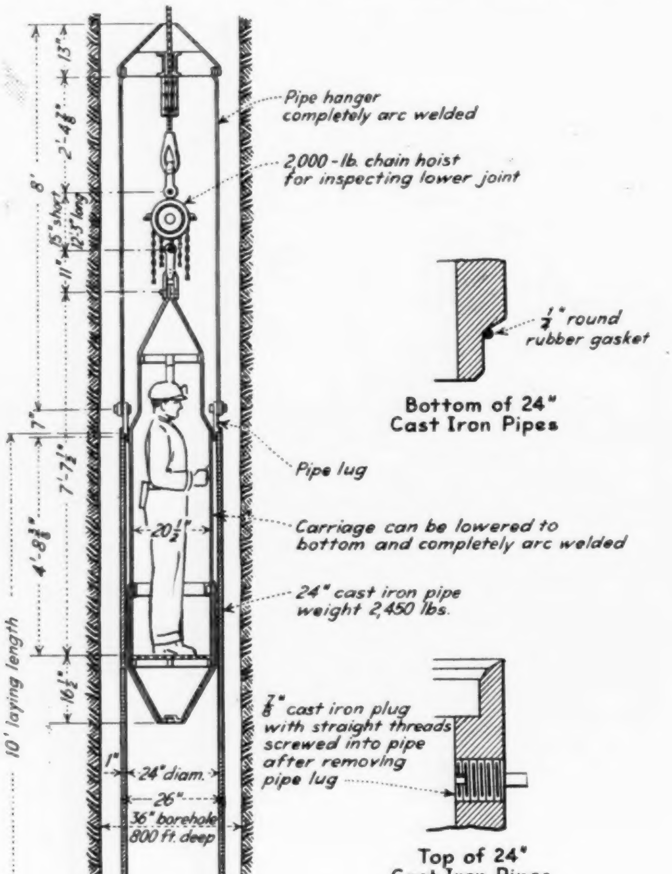
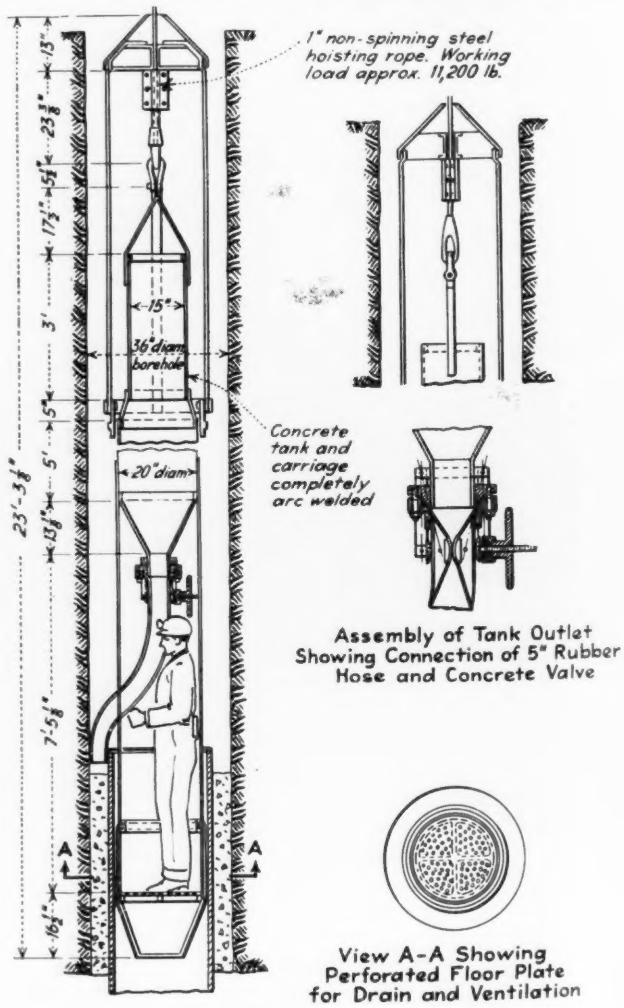



Fig. 2—Man-cage combination used in concreting pipe in place.



# The World's Longest Belt

**Inaugurates a new era in low-cost hauling**

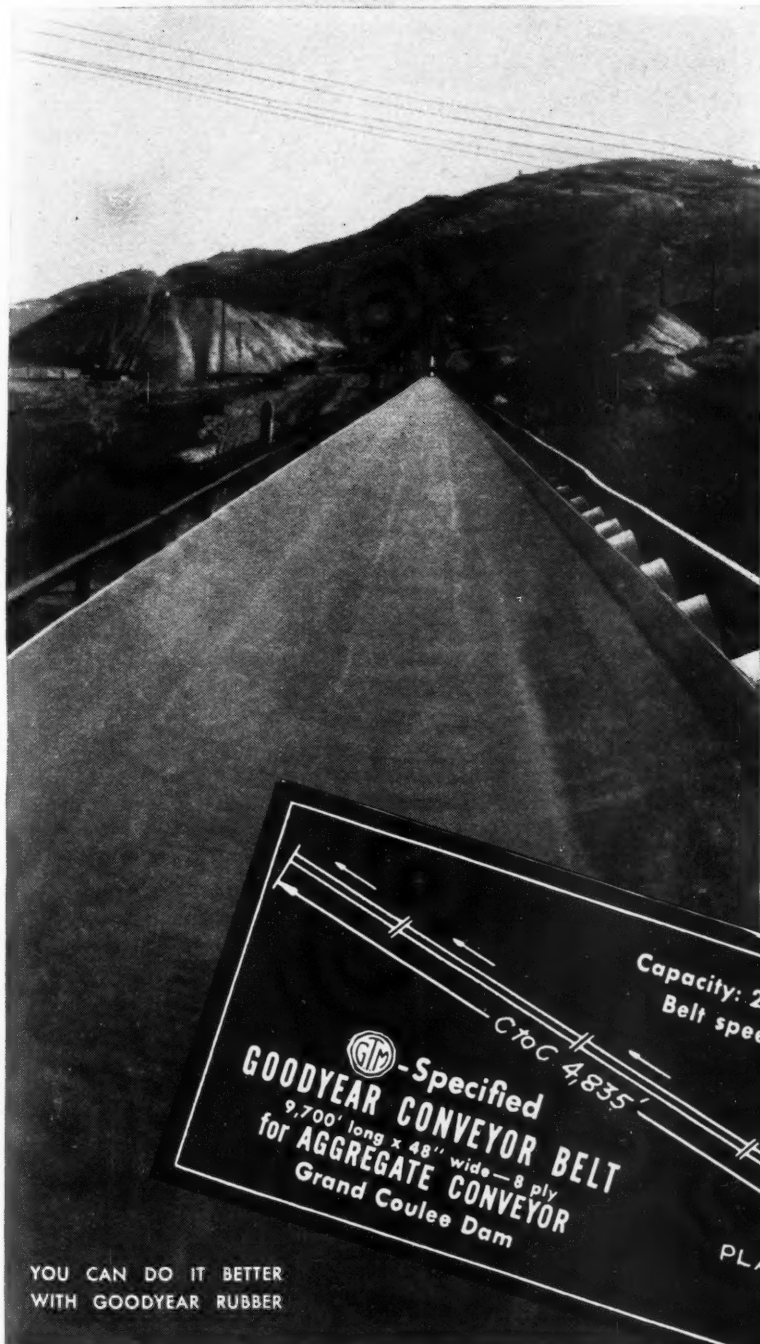
TODAY at Grand Coulee Dam Goodyear rubber is teaching industry a new lesson in the economical transport of bulk materials. There the longest belt the world has ever seen—a continuous rubber conveyor almost TWO MILES long—can haul 2,000 tons of stone aggregate every hour from the screen house to the dam site nearly a mile away.

This gigantic conveyor, a single Goodyear belt weighing 80 tons, operates on centers of 4,835 feet. One hundred and twenty-five horsepower is required to start the empty belt. Once loaded, the belt actually generates power because of the favorable 3½% downgrade. It provides a continuous, uniform delivery of aggregate from stock piles one mile away, to stock piles adjacent to the dam site.

Never before has such great tonnage been carried so far by a single belt. But Goodyear *knew* it could be done because Goodyear's technical progress in rubber has been steadily multiplying conveyor belt capacity by millions of tons.

Long distance conveyor haulage offers great new possibilities in moving coal, ore and other tonnage materials at low cost over ground where other transport is infeasible or impracticable. A series of such belts can operate over a distance of many miles.

But even if your problem be only the conveying of empty cartons down a packing bench, or gravel from pit to grading screens, *you can do it better with Goodyear rubber!* Let the G.T.M.—Goodyear Technical Man—prove it to you. Just write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.





*Centennial of Charles Goodyear's discovery of vulcanization*

THE GREATEST NAME IN RUBBER

GOODYEAR

"Inasmuch as the water in some cases, is too hard on steel pipe for it to last very long as a borehole lining, other materials, such as wood, terra cotta, bronze or cast iron, have been used. Due to its cost, bronze seldom is employed except where only the inlet or outlet end of the hole need be lined in order to attach connecting pipe lines. Wood and terra cotta also are very wasteful of precious borehole space. Cast iron is more desirable than steel but, due to its weight and the usually bulky couplings, is not often used as a borehole lining. A notable exception, however, is shown in Figs. 1 and 2. It will be observed that the borehole is unusually large, being 36 in. in diameter. The total depth is 800 ft. It was desired that this hole be lined accurately and carefully with a strong and uniform concrete mixture. This result could be assured only by building up both metal lining and concrete in sections under direct supervision.

"On the other hand, it was the large bore of the hole that made this method possible, as the cast-iron lining sections were to be 24 in. i.d., providing just sufficient room for a special man cage and man to move up and down inside. The method of placing the successive sections of cast-iron pipe is illustrated in Fig. 1. The man cage is suspended by a 1-ton chain hoist from a protecting canopy or shield, which also carries pipe-hanger straps to which the pipe section is attached by suitable lugs. The canopy in turn is suspended in the hole by means of a 1-in. non-spinning steel hoisting rope running up to a suitable steam hoist on the surface. The entire canopy, cage and pipe-section combination, having been assembled on the surface with the man in the cage, now is lowered down the hole until the top of the last preceding section of pipe is reached.

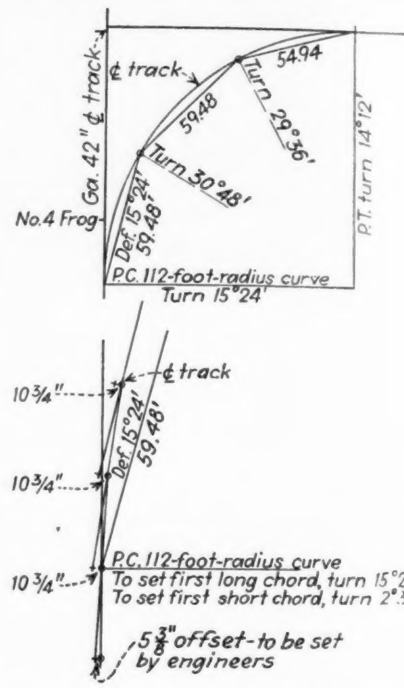
"By means of the chain hoist the man then lowers himself to inspect the joint made by these two pipes or to maneuver his pipe into proper jointing position, the hoist at the surface being able to lift and lower the assembly as required on signal. When the joint is satisfactory the man returns himself to his upper position by chain hoist and detaches the lifting lugs. This is done by removing four $\frac{7}{8}$-in. tap bolts. The tapped holes in the pipe wall then are filled with special cast-iron straight-threaded plugs having a screw-driver notch in the inside end and a flat extension on the other end, both in the same plane. The extension is left in a vertical position and serves to lock the plug in the concrete and prevent it from working out. The joints are made watertight by means of a rubber-cord gasket which is stuck in place for lowering by thick shellac. As each section of pipe is placed, and the lugs are detached and the holes plugged, the man is returned to the surface and transferred to the second cage (Fig. 2). This cage combination includes the same canopy but a new man cage and, in place of the chain hoist, there is a steel concrete tank with a 5-in. rubber hose and a squeezer valve. This assembly being lowered to a suitable point, the man distributes the batch of concrete, tamping it into place with a long rod or stick and returning for more, if necessary.

"A vital part in the success with which this large job was handled was played by arc welding, as it was by this means that the cages, canopy and tank were put together. This means was chosen to secure the maximum of strength, dependability and compactness, and the least risk for the workmen. A much less satisfactory fabrication of this equipment by bolts and rivets also would have been much more expensive. The saving in cost is conservatively estimated at $500."

## Curves Instead of Turns Cut Mining Costs

Modern mining involves curves and curves, states E. A. Smith, chief engineer, Central Elkhorn Coal Co., Estill, Ky., in pointing out that running time means much in mine performance and also that better running time is possible through the higher speed permitted by curves instead of turns. Curves offer less resistance than turns, reducing the hazard, cutting down losses in running time, eliminating spillage and consequent accumulations of material on the track and rails, and permitting trip momentum to be preserved for negotiating hills, with resultant decrease in the call for power on hard pulls. All the above advantages mean cash to the operator.

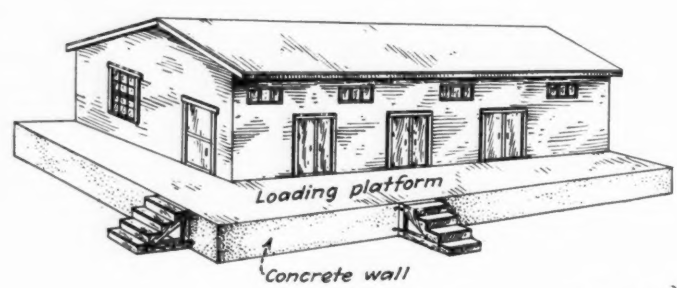
The accompanying illustration, submitted by Mr. Smith, shows diagrammatically a 122-ft.-radius curve, 42-in.-gage track, using a No. 4 frog. Such a curve is easy for the engineers to lay out to show the desired short chords and their respective offsets. From this information the mine supervisors can run in the curve—at least for one long chord length at a time—using the spads placed by the engineers as basing points for offsets, etc. The 10-ft. chords, when used in driving a 112-ft.-radius curve, are offset $10\frac{3}{4}$ in. in every 10 ft., as shown in the detailed drawing. Also illustrated is the fact that the first short chord requires an offset of only $5\frac{3}{8}$ in., or a deflection of 2 deg. 34 min. New short chords can be set at the ends of the long chords by the engineer by turning tangent to the curve and one deflection more.

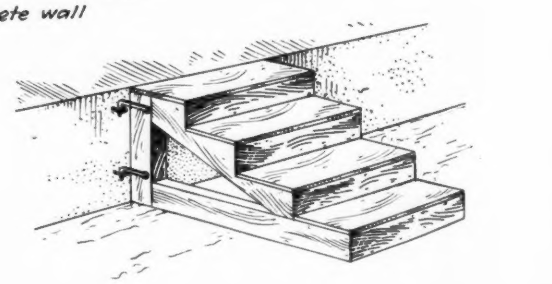



How to lay out a 112-ft.-radius curve for the guidance of mine supervisors.

## Steps for Loading Platforms

Store and supply houses rarely have more than one or two flights of stairs from ground level to truck loading and unloading platforms. To eliminate the practice of men jumping off the platform to the ground, rather than walking the additional distance to the stairs, movable wooden steps are constructed and hooked to the side wall of the building when trucks are not unloading. Details of movable stairs and method of attaching them to concrete walls below the platform are shown in the illustration.



Method of attaching movable steps to concrete loading platform.

# WORD FROM THE FIELD

## TVA Absolved of Wrong By Congress Probers

The Tennessee Valley Authority was absolved of charges of wrongdoing by a majority on April 3 of the joint Congressional committee which spent nine months in investigating its activities (*Coal Age*, May, 1938, p. 98). The probers specifically approved the two remaining directors, TVA methods of operation, its program of navigation, flood control, electric power and fertilizer development. The majority report was signed by Senators Donahey (D.) of Ohio, Mead (D.) of New York, Schwartz (D.) of Wyoming, Frazier (R.) of North Dakota, and Representatives Thomason (D.) of Texas and Barden (D.) of North Carolina.

The report declared that charges of dishonesty brought by Dr. Arthur E. Morgan, deposed chairman of TVA, against his fellow directors, Dr. Harcourt A. Morgan and David E. Lilienthal, were "without foundation, not supported by the evidence, and made without due consideration of the available facts." It was Dr. Morgan's removal by President Roosevelt that precipitated the Congressional investigation.

In regard to TVA power rates as a "yardstick," the committee majority found that "by cost charges and accounting methods applicable to private industry, the electric rates of the Authority provide a legitimate, honest yardstick of equitable rates of private industry."

A minority report, filed by Senator Davis (R.) of Pennsylvania and Representatives Jenkins (R.) of Ohio and Wolverton (R.) of New Jersey, charged that TVA was shot through with waste and inefficiency and was "arbitrary, dictatorial and unbusinesslike." It also contended that the TVA power yardstick is "not only meaningless but worse; is misleading, deceptive, unfair and dishonest as a measure of the rates of privately owned utilities not enjoying the subsidies and advantages of which TVA may avail itself." It recommended a sweeping reorganization of the agency, including transfer of its flood-control and power-generation activities to the army engineers, and of its agricultural program to the Department of Agriculture.

## Coal Lands Change Hands

The Golden Cycle Corporation, through its subsidiary, the Pikes Peak Fuel Co., Colorado Springs, Colo., announced on March 29 that it had purchased the William A. MacKenzie coal lands in Fremont County, Colorado. Five mines operated under lease on the property are the Red Arrow, Manley Coal Co., Little Johnnie, Zenith and Peacock.

## Hard-Coal Stokers Heat School

What is said to be the first installation of anthracite underfeed stokers of the moving-grate type in a New York State institution of learning has just been completed in the Central High School at Vestal. The heating plant comprises three Fitzgibbon boilers rated for 30,360 sq.ft. of steam radiation, fired by CE-Skelly stokers. The heating engineers were Robson & Wood, Syracuse, N. Y., and the heating contractor was S. P. Ainslie, Johnson City, N. Y.

## Keeping Step With Coal Demand

### Bituminous Production

| Week Ended | 1939 (1,000 Tons) | 1938* (1,000 Tons) |
|---|---|---|
| March 4 | 8,442 | 6,405 |
| March 11 | 8,000 | 6,439 |
| March 18 | 7,670 | 5,814 |
| March 25 | 7,460 | 5,347 |
| April 1 | 7,125 | 4,554 |
| April 8 | 1,860 | 5,614 |
| Total to April 8 | 106,786 | 91,304 |
| **Month of March** | **35,290** | **26,745** |

### Anthracite Production

| | | |
|---|---|---|
| March 4 | 915 | 1,051 |
| March 11 | 769 | 1,012 |
| March 18 | 791 | 611 |
| March 25 | 789 | 632 |
| April 1 | 803 | 893 |
| April 8 | 984 | 752 |
| Total to April 8 | 13,682 | 13,101 |
| **Month of March** | **3,579** | **4,015** |

* Outputs of these two columns are for the weeks corresponding to those in 1939, although these weeks do not necessarily end on the same dates.

### Bituminous Coal Stocks

| | (Thousands of Net Tons) March 1 1939 | Feb. 1 1939 | March 1 1938 |
|---|---|---|---|
| Electric power utilities | 8,456 | 8,379 | 8,565 |
| Byproduct coke ovens | 7,373 | 7,374 | 5,823 |
| Steel and rolling mills | 879 | 742 | 919 |
| Railroads (Class 1) | 6,719 | 5,819 | 6,174 |
| Other industrials* | 10,443 | 10,956 | 10,862 |
| Total | 33,870 | 33,270 | 32,343 |

### Bituminous Coal Consumption

| | (Thousands of Net Tons) Feb. 1939 | Jan. 1939 | Feb. 1938 |
|---|---|---|---|
| Electric power utilities | 3,056 | 3,595 | 2,888 |
| Byproduct coke ovens | 4,346 | 4,751 | 3,539 |
| Steel and rolling mills | 759 | 858 | 725 |
| Railroads (Class 1) | 6,561 | 7,149 | 6,169 |
| Other industrials* | 9,482 | 9,832 | 9,102 |
| Total | 24,204 | 26,185 | 22,423 |

* Includes beehive ovens, coal-gas retorts and cement mills.

## Minimum Price Goal Nears; Maloney Scores Critics

Washington, D. C., April 20—While the Committee for Amendment of the Coal Act has been endeavoring to gain support for the Allen bill (*Coal Age*, April, p. 88) the National Bituminous Coal Commission has proceeded with its work necessary to setting minimum prices for bituminous coal under the Guffey-Vinson act. The final hearing on determination of the weighted average of total costs of coal produced in Districts 1-7, 9 and 10 got under way on March 27, and voluminous testimony and cross examination have been elicited. But the hearing on discounts to be allowed to distributors, scheduled for April 6, has been continued indefinitely. On April 17, however, a start was made on receiving evidence to establish marketing rules and regulations in Districts 1-13, 15, 17, 19 and 22; and two days later similar proceedings in regard to Districts 14, 16, 18, 20 and 23 were scheduled to get under way.

Commissioner Walter H. Maloney took issue sharply with criticism of the coal act by proponents of the Allen bill late in March. Great losses by the coal industry this year alleged to be due to demoralized prices caused by provisions of the act he said are "the result of the need for the present coal law, which will be in effect when the Commission establishes minimum prices, which are now in the final stages of compilation.

"The loss in the coal industry," continued the Commissioner, "cannot be the result of any law, but when minimum prices are made effective by this Commission they will prevent such losses because the coal industry must then sell its coal at or above the cost of production. Until the minimum prices are made effective, however, the coal industry likely will continue to sell its coal below the cost of production. It must be observed that this law does not fix the prices of coal; it only sets a base below which coal may not be sold at the mines.

### Agencies Not a Cure-All

"The Allen bill may be said to be an effort to avoid the effect of the anti-trust laws, with no corresponding benefit to the coal industry. It provides for the establishment of marketing agencies; so does the present law. To date, our Commission has approved many of them and they may now perform many of the acts permitted under the Allen bill, but they are not doing it, and coal is now being sold at cutthroat prices regardless of marketing agencies."

In regard to the expense of administering the coal act, which has been severely criticised by adherents of the Allen bill, Commissioner Maloney declared: "The cost and expense is part of the cost of

production which is always, in the course of good business, passed along by the producer to the consumer. However, it is only a drop in the bucket compared to the enormous losses suffered by the coal industry for many years, all because there has been no law to save the industry from itself and prevent it from selling its production below cost." Limitations of the 30-day clause upon the right to contract, he pointed out, is removed automatically when minimum prices are established.

"Practically all features of the proposed Allen law," continued Mr. Maloney, "have heretofore been discussed in Congress and have been found insufficient. It is a plan advocated by low-cost producers who produce only a small percentage of the coal necessary to supply the needs of the people in the United States, and it is apparent that the Government must protect the balance of the producers in order that there will be fairness in the opportunity of producers to market their product and insure an adequate supply of fuel. With few exceptions, those who are supporting the Allen bill opposed the present law. Minimum prices would now be in effect if it were not for the resistance offered by some large producers and some large consumers."

Rules and regulations to require bituminous coal distributors to maintain and observe minimum prices and marketing rules and regulations to be set were established by the Commission on March 24. It also ruled that all bituminous coal sold, delivered or offered for sale in intrastate transactions in Tennessee and Utah would be subject to the provisions of the coal act, effective April 15 and May 1, respectively.

## Eight Hard-Coal Measures In Legislative Hopper

Eight bills designed to rehabilitate the anthracite industry were introduced in the Pennsylvania Legislature at Harrisburg during the first week of April. Some of the measures provide for regulation and others call for research to find new methods of using hard coal. In the latter category is a bill presented by Senator Robert M. Miller, of Luzerne County, which has been amended by him to provide for setting up a research bureau at Pennsylvania State College. An appropriation of $1,000,000 for this purpose is sought. A similar measure, calling for a $450,000 fund, has been introduced in the House at Washington by Representative J. Harold Flannery, also of Luzerne.

## Rocky Mountain Meeting Set

Arrangements are under way for the 37th annual meeting of the Rocky Mountain Coal Mining Institute. The gathering will be held June 15-17 at the Hotel Utah, Salt Lake City, Utah. Many interesting papers are to be presented and entertainment will not be overlooked. Committee chairmen have been named as follows: general, Carl W. Sinclair; arrangements, Moroni Heiner, president, Utah, Salt Lake City, Utah. Many inquet, L. R. Weber, president, Liberty Fuel Co.; finance, Joseph Parmley, Utah Fuel Co.; exhibits, D. C. Frobes.

# Engineers Urge Research Program to Aid Bituminous Coal Industry

A THREE-year research program designed to restore large tonnages to the annual production of the bituminous coal industry was charted by prominent engineers at a meeting on March 21 at the William Penn Hotel, Pittsburgh, Pa. The campaign, which it was urged be launched as soon as possible, is based on a proposed expenditure of $235,000 a year. As members of the research committee of Bituminous Coal Research, Inc., the group pointed out how large markets could be regained and retained if certain technical developments in coal handling and firing equipment were perfected to a degree comparable to equipment now used with competing fuels. Although other fuel industries have forged ahead with large research and engineering programs, to the detriment of the coal business, the engineers were confident that the tide will be turned when the coal industry supports the plan outlined.

The program of technical investigations and service mapped out at the close of the meeting included the development of methods and equipment for (1) complete automatic heating of residences and buildings with a wide range of coals; (2) ceramic and metallurgical heating and melting with pulverized coals; (3) complete gasification of coal; (4) a coal-dust engine; (5) collection and handling of ash without detrimental slagging, clinkering or discharge into the atmosphere. While planning experimentation on the foregoing subjects, the committee also proposed a system of coordination of coal research throughout the country by making Bituminous Coal Research, Inc., a clearing house for problems confronting the coal industry and for research findings that help to solve these problems.

As the industry's own cooperative research agency, B.C.R. recently completed 3½ years of successful work on a budget only one-tenth the size of that proposed for the new program. Among the practical studies completed were the dust-proofing of coals with petroleum products; performance characteristics of bituminous coals in residential stokers; surveys of residential heating and pulverized firing of coal; studies on fundamentals of combustion in stokers, and on segregation of coal in bunkers.

Participating in the program conference, under the chairmanship of H. N. Eavenson, president, Clover Splint Coal Co., were: John C. Cosgrove, president, Bituminous Coal Research, Inc.; J. D. Doherty, Koppers Coal Co.; John Fielding, Jr., Hanna Coal Co.; E. R. Kaiser, Bituminous Coal Research; E. J. Kerr, Lorain Coal & Dock Co.; Otto J. Menke, Island Creek Coal Co.; J. B. Morrow, vice-president, Pittsburgh Coal Co.; F. K. Prosser, Norfolk & Western Ry.; C. A. Reed, National Coal Association; George C. Ritchie, Chesapeake & Ohio Ry.; Ralph A. Sherman, Battelle Memorial Institute; R. F. Stilwell, Red Jacket Coal Co.; J. E. Tobey, Appalachian Coals, Inc.; Clyde E. Williams, Battelle Memorial Institute.

## Coming Meetings

- American Coal Distributors' Association: annual meeting, May 25-27, French Lick Springs, Ind.
- Black Diamond Jubilee: May 25-27, Walsenburg, Colo.
- Indiana Coal Mining Institute: annual meeting, May 27, Vendome Hotel, Evansville, Ind.
- Stoker Manufacturers' Association: annual convention, June 1 and 2, French Lick Springs, Ind.
- Mine Inspectors' Institute of America: thirtieth annual convention, June 5-7, William Penn Hotel, Pittsburgh, Pa.
- American Retail Coal Association: annual convention, June 6-8; exposition, June 3-11; Sherman Hotel, Chicago.
- Illinois Mining Institute: 21st annual boat trip and summer meeting, June 9-11, aboard Str. "Golden Eagle," leaving St. Louis June 9 and returning June 11.
- Rocky Mountain Coal Mining Institute: 37th annual meeting, June 15-17, Hotel Utah, Salt Lake City, Utah.
- Pennsylvania Anthracite Section American Institute of Mining and Metallurgical Engineers: summer meeting, June 30, Irem Temple Country Club, Dallas, Pa.

## Alabama Housing Project To Use Coal Heat

Installation of a central coal-fired plant for house and water heating in the new $4,660,000 Elyton Village housing project was decided upon on April 6 by the Birmingham (Ala.) Housing Authority. The central plant was chosen after an inspection of other low-rent projects in the South, and coal was decided upon over gas as the fuel largely because Birmingham is a coal-producing center.

Frank E. Spain, Authority chairman, said the decision was based on an analysis which showed that economy in operation through a central heating and hot-water plant would more than pay for the additional cost of installation and would contribute to the low-cost character of the entire project.

## New Stokers Are Larger

Residential and commercial stokers of the Link-Belt line for 1939, according to J. E. Martin, manager of the company's stoker division, are larger and heavier, with greater hopper capacity, but without sacrificing low filling height. The color is maroon, in two shades, trimmed with chromium and black. The transmission compartment and the inside of the hopper are sprayed wth aluminum-color rust-resisting compound. The hopper lid is unusually heavy and rigid; and the louvers for the air intake are located in the back panel instead of at the side.

An outstanding feature is elimination of the shear pin. Overloads are handled

by an inbuilt device that makes it rarely necessary to open the cleanout. An automatic load signal also is provided. Another feature is the inlet-type air meter, which automatically controls the air supply so as to compensate for changing combustion conditions.

## Utilization Program Arranged For Illinois Coal Course

The program for the fifth course in coal utilization, to be held at the University of Illinois, Urbana, Ill., May 23-25, has been arranged. Under the general charge of Prof. A. C. Callen, head of the department of mining and metallurgical engineering, these courses in past years have drawn an attendance of 250 to 350 representatives of coal producers, marketing agencies, and domestic and small industrial utilization fields. This year's program, in charge of H. P. Nicholson, assistant professor of mining engineering, is as follows:

Opening address, M. L. Enger, dean, College of Engineering, University of Illinois; "Fundamentals of Marketing," P. D. Converse, professor of business organization and operation, University of Illinois; "Customer Turnover and Its Effect on Business," E. H. Kelling, Center Street Fuel Co.; "What Is Behind the Heating Complaint," Stewart Orgain, president, Power Plant Engineering & Testing Co.; "Customer Demands," Ernest Linquist, Bunge Brothers Coal Co.; "The Smoke Problem," R. R. Tucker, Commissioner of Smoke Regulation, St. Louis, Mo.; "Evaluation of Coal for Use in Domestic Stokers," R. A. Sherman, Battelle Memorial Institute; "Coal Preparation," C. Y. Thomas, Pittsburg & Midway Coal Mining Co.; "Simplification of Coal Sizing," W. C. McCulloch, United Electric Coal Cos.; "Recent Developments on Small Stokers," T. A. Marsh, Iron Fireman Mfg. Co.

"Taking Chances in Coal Sampling," H. F. Hebley, Commercial Testing & Engineering Co.; "Designing of Domestic Boilers for Stoker Firing," W. B. Hughes, Butler Mfg. Co.; "Stoker-Fired Warm-Air Furnace in the Research Residence," Seichi Konzo, special research assistant professor of mechanical engineering, University of Illinois; "Domestic Stokers," A. O. Dady, David Bradley Mfg. Works; "What Fuel Engineering Is Doing for Coal," R. L. Rowan, General Coal Co.; "Fuel Engineering Service on the Chicago & Eastern Illinois R.R.," C. H. Lammers; "Spreader Stokers and Their Place in the Picture," E. L. Beckwith, Detroit Stoker Co.

## Underfeed Stoker in Lead

The underfeed stoker continues to lead all other types of burning equipment in Chicago by a wide margin, according to the monthly report of heating equipment installed in February last under permits required by the city Smoke Department. A total of 52 permits were granted in that month for new installations, 39 of which covered underfeed stokers; 6 oil burners; 5 hand-fired boiler permits under agreements, and 2 spreader-type stokers. No permits were issued for gas burners.

# How and Why Backfill Anthracite Mines Discussed by A.I.M.E. at Scranton

A SYMPOSIUM on backfilling with a notable example of the successful total extraction of a 4½-ft. coal seam closely underlying an industrial and residential district without injury to surface, buildings or other improvements, occupied the attention of the members of the Anthracite Section of the American Institute of Mining and Metallurgical Engineers, at Scranton, Pa., on March 25.

Though the "Driving Park" area in the city of Scranton is highly populated and industrialized, asserted Frank D. Shoemaker, mining engineer, Penn Anthracite Collieries Co., the top, or Rock Bed in the Leggitts Creek Mine was completely extracted without property damage. This section is flat and occupies what was once the bed of the Lackawanna River. It has paved streets, gas and water mains, many medium-class dwellings, a large bakery, two dyeing and cleaning plants, a large oil-distribution plant and other industrial enterprises. The New York, Ontario & Western R.R. and the Delaware & Hudson R.R. traverse the area, the former passing over the latter on a long overhead bridge with cut-stone walls. At another point the tracks of the former cross a paved street on a bridge.

Nearly rectangular, the area embraces about 100 acres bounded on three sides by the Lackawanna River. The Rock Bed, itself 4½ ft. thick, is the top seam of six workable coal beds, with thicknesses varying from 3½ to 14 ft., with a combined thickness of 38 ft. It lies 100 ft. below the surface; the lowest bed is 350 ft. lower. The roof of the Rock Bed is a hard fine-grained sandstone, 30 to 40 ft. thick, covered by 60 to 70 ft. of saturated alluvial deposits including much yellow sand. Slight crevices in the sandstone admit water which carries this fine sand into the mine, and a rise in the Lackawanna invariably floods unsealed cellars for 1,000 ft. or more from the river.

In mining, the Rock Bed was left entirely in place but all the five beds below were "first-mined." To prevent its high pillars from chipping, it was found necessary to flush the Fourteen-Foot Bed, which lies about 50 ft. below the Rock Bed. Material to flush the voids was taken, said Mr. Shoemaker, from the Lackawanna River. The seam in the southern corner of the property in places pitches upward as much as 50 deg. Here the Rock Bed was lifted so high that it has been eroded.

For the flushing of the Fourteen-Foot Bed, a 10-in. borehole 60 ft. deep and located 50 ft. from the river was drilled; a concrete tank was provided in which to settle material arriving from the river; also gates, flumes, dams and pipe lines. The borehole pipe was cased and grouted and provided with a 6-in. extra-heavy wrought-iron pipe which, as it would have to be renewed later, was merely suspended in the hole and not grouted into place. It was found that passing 50,000 cu.yd. of material through it would cause sufficient wear to necessitate removal.

### Settled Solids From River

The settling tank was 50 ft. in diameter and about 15 ft. deep with the borehole almost at its center, added Mr. Shoemaker; it has perpendicular sides and its rim was arranged to be just above high-water mark, with its bottom pitching toward the borehole. A long, low dam was constructed diagonally across the river to a point 300 ft. upstream to catch material rolling along the river bottom and direct it upstream to the tank through a concrete-walled flume 10 ft. wide. This flume delivered the material to the tank so that it traveled circumferentially to another water channel by which it returned to the river, leaving its solids behind. By gates on the inlet flume, the flow of water to the tank could be closed off.

Another flume from the river, also provided with regulating gates, supplied water for cleaning the flushing lines and for washing deposited débris into the flush pipes. This water was arranged to enter into the borehole through a pipe below the level of the tank bottom and also into a small trough around the tank circumference, so that water from it could be spilled into any part of the tank.

In the borehole was fitted a heavy wood plug, long enough to extend above the level of the deposits, but tapered for a sufficient length that raising or lowering it by a chain block operated from a platform built over the tank would control the flow of water and solids. A screen box around hole and plug prevented cobblestones and other large objects from entering the mine.

Before leaving at the end of the day, the man who alone operated the outside plant during its single shift plugged the hole and opened the gates of the inlet flume. The river during the night would fill the tank with about 500 cu.yd. of rubbish. After closing the gates and ascertaining by telephone that the line watchers below were at their stations, he would

## Sales of Mechanical Stokers Again Top Last Year

Sales of mechanical stokers in the United States during February last totaled 2,561, according to statistics furnished the U. S. Bureau of the Census by 101 manufacturers (Class 1, 49; Class 2, 34; Class 3, 35; Class 4, 31; Class 5, 10). This compares with sales of 3,587 units in the preceding month and 2,502 in February, 1938. Sales by classes in February last were: residential (under 61 lb. of coal per hour), 1,995 (bituminous, 1,785; anthracite, 210); small apartment-house and small commercial heating jobs (61 to 100 lb. per hour), 187; apartment-house and general small commercial heating jobs (101 to 300 lb. per hour), 193; large commercial and small high-pressure steam plants (301 to 1,200 lb. per hour), 129; high-pressure industrial steam plants (more than 1,200 lb. per hour), 57.


# LAY-SET *Preformed* -THE WIRE ROPE ENGINEERS LOOK UP TO...

There are several good reasons why engineers and operators recognize the superiority of LAY-SET Preformed Rope for the majority of applications. In the first place, LAY-SET is preformed and so is free of the locked-up internal stresses which cause kinking, whipping, bad spooling on the drums, or rotating in sheave grooves. LAY-SET resists all these destructive tendencies. Being carefully preformed, LAY-SET is much easier, faster and safer to handle. It requires no seizing when cut; splices or sockets readily and with greater certainty. You gain *all* these advantages when you specify LAY-SET Preformed—any one of which might easily result in greater dollar value for you. All Hazard Wire Ropes Made of Improved Plow Steel are Identified by the Green Strand.

**BUY ACCO QUALITY** *whether for Hazard Wire Ropes—American Chains (Weed Tire Chains—Welded or Weldless Chains)—Campbell Abrasive Cutting Machines—Wright Hoists—Page Chain Link Fence—Page Welding Wire—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.*


**Send for this interesting and constructive folder today.**

## HAZARD WIRE ROPE DIVISION

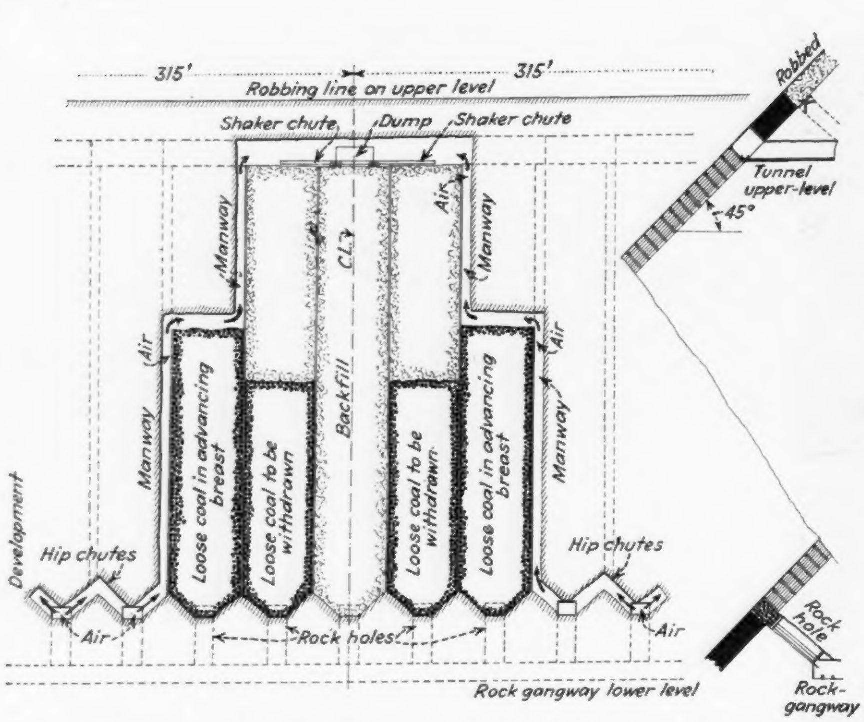
*Established 1846*

**WILKES-BARRE, PENNSYLVANIA**

*District Offices:* New York, Chicago, Philadelphia, Pittsburgh, Fort Worth, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

## AMERICAN CHAIN & CABLE COMPANY, Inc.

AMERICAN CHAIN DIVISION • AMERICAN CABLE DIVISION • ANDREW C. CAMPBELL DIVISION • FORD CHAIN BLOCK DIVISION • HAZARD WIRE ROPE DIVISION • HIGHLAND IRON AND STEEL DIVISION • MANLEY MANUFACTURING DIVISION • OWEN SILENT SPRING COMPANY, INC. • PAGE STEEL AND WIRE DIVISION • READING-PRATT & CADY DIVISION • READING STEEL CASTING DIVISION • WRIGHT MANUFACTURING DIVISION • IN CANADA: DOMINION CHAIN COMPANY, LTD. • IN ENGLAND: BRITISH WIRE PRODUCTS, LTD. • THE PARSONS CHAIN COMPANY, LTD. • ***In Business for Your Safety***




**Shortwall method of backfilling. Coal supports roof of chamber and rock slides into chamber to replace it as it is drawn out. Note how air ascends against face and does not have to return after its ascension.**

direct water into the borehole to clean out any dry and hardened deposits. Then, if he received notice that the lines were clear, the plug would be carefully raised and material allowed to pass down into the hole where the stream of water from the subsurface pipe carried it through the lines.

Water from the circumferential flume was directed where needed to clear the tank sides. Normally the tank was freed in an hour of flushing material and then the plug was replaced, the inlet gates opened and the material in the tank replenished. Of this material, plenty was always available, as the low dam caused an accumulation of refuse whenever the gates to the tank were closed. Sedimentation in the tank usually took 2½ hours. Thus in from eight to ten hours about 1,500 cu.yd. was flushed into the mine.

Proportion of water to solids was 4 to 1, surmised Mr. Shoemaker. How much water should be used was dictated by experience and by telephoned information from the man at the inside end of the flush line. Filling consisted of sand, pebbles, ashes and loam with a high percentage of carbonaceous silt, which proved to be an excellent flushing mixture, traveling well in the lines and into mine crevices, not being carried away materially by the escaping water and later resisting compression under weight.

All kinds of material came into the tank and had to be removed by poles and hooks of various kinds. If the material was fed too rapidly or the plug was not dropped promptly on a signal from the mine, the lines would block, many hours would be lost and much expense be incurred.

The Rock Bed was opened in this mine by driving a pair of main headings from the shaft through the center of the area, with crossheadings at 300-ft. intervals, having chambers 28 ft. wide with pillars of the same width and crosscuts 10 ft. wide at 60-ft. centers.

Rather than build another plant for the Rock Bed when that had to be flushed, it was decided to carry the material by 700 ft. of line in the Fourteen-Foot Bed on a dip averaging 7 per cent to an 8-in. cased vertical borehole, up which it was to be passed 50 ft. to the Rock Bed. Even when there, the material had to be, and could be, carried successfully over various gradients and for distances as long as 2,500 ft. to points of discharge and yet it would still be traveling fast enough for distribution across the places to be filled and with sufficient force for tight emplacement of the material against the roof. Extra long sweep ells with plugs for cleaning the pipe in case of blockage reduced loss of head due to friction both at the bottoms of holes and at bends in the lines. Wood and spiral-steel pipe of 6- and 8-in. diameter served as transmission lines. When reasonably thin the flushing material passed up the vertical hole as readily as through horizontal pipes.

Batteries of double plank anchored to heavy props on 18- to 36-in. centers were built across the mouths of chambers to confine material, continued Mr. Shoemaker. Through each battery, openings about 6 in. square were provided and covered with 3/64-in. round-mesh shaker jacket material to permit some of the water to drain. Most of the water, however, backed up to the next crosscut above the battery and through this opening it passed into the adjoining chamber. To insure that the material would be packed tightly despite the easy inclination, the pipes, on starting to fill a chamber, were extended almost down to the battery and removed a length at a time as work up the inclination proceeded.

When the chambers in any one panel had been completely filled and drained, every fourth pillar was removed by the split-and-retreat method, followed immediately by construction of a battery at the stump and the flushing of voids. Then, the intermediate three pillars were mined one at a time, and the voids filled as soon as the pillar was removed. In average figures this plant and flushing program required eight men who placed 1,500 cu.-yd. daily at a cost of 12c. per cubic yard for labor and material.

For each 2 cu.yd. of flushing material placed, 1 cu.yd. of otherwise unrecoverable coal was saved. Thus the flushing cost was about 24c. per ton of coal recovered. If the coal had been merely first-mined without flushing, surface improvements probably would have been seriously damaged by inflowing water, quicksands and surface subsidence.

Leveling lines run and rerun over the surface at intervals showed no immediate changes in elevation. Five years after completion, such surveys showed a maximum sag near the center of the area of 1½ in. Stone bridge abutments and masonry buildings developed no open seams.

Though he had never recommended backfilling in his professional work, recognizing that the first cost was almost prohibitory in the reopening of old workings, declared R. Y. Williams, chairman, Anthracite Section, he nevertheless believed that in the end the backfilling of a mine throughout its operation would be a source of economy, especially if the operating company owned the coal outright or if the leasing company would make a suitable allowance for complete extraction by backfilling methods. In the coal mines of the United States, no one had done more backfilling than the Philadelphia & Reading Coal & Iron Co.

### Where Backfilling Began

Buck Ridge Colliery was the first mine in the world to be backfilled; the purpose of the backfilling was to stop a fire, reminisced Leslie D. Lamont, of the P. & R. C. & I. Co., in a paper presented by Mr. Williams. Next came the Laurel Hill Mine at No. 5 Colliery, Hazleton, Pa., where the purpose was to check a squeeze. This was followed by the work at the Kohinoor Colliery, in Shenandoah, where material was backfilled to support the surface. Backfilling was of later date in Germany and Great Britain, but the practice has been more general in Germany than here. It had been used in America not only for the foregoing purposes but for the support of barrier pillars where insufficient coal had been left.

Some places have been backfilled with breaker silt and some with breaker waste broken to about ½-in. size, wrote Mr. Lamont. Maple wood pipes had a longer life than redwood. Both centrifugal and plunger pumps were used, the former being constructed of diamite and the latter of cast iron. Breaker silt needs a minimum flow of current of 9 ft. per second; with breaker waste a speed of 10 to 15 ft. is necessary.

To avoid having to construct heavy batteries and having them break down under heavy water pressure, thus choking live workings with silt or waste which had to be removed, boxes with saw cuts at intervals were placed on the floor of the bed and through the battery into which water would pass, leaving the material behind in the fill. These boxes were left behind and became buried as the backfilling retreated. Experience with the flushing of 3,600,000 cu.yd. of backfilling showed the cost to be 10 to 15c. per cubic

yard. Backfilling placed by compressed air cost more than that deposited hydraulically, as the air used alone would cost as much as the entire work when done with water.

Backfilling, declared Henry A. Dierks, mining engineer, Pierce Management, is the least expensive way of operating in pitching beds if all factors are considered, even when the support of the surface is not important, and in fact it will doubtless become economically inescapable when the lower levels are reached. Backfilling, he declared, would reduce maintenance and drainage costs, improve ventilation, increase recovery of coal, and lower amortization charges for capital invested and for development. Mr. Dierks presented a system following German practice, which had been prepared for use at the East Bear Ridge Colliery. It is suitable for use with coal pitching 45 deg. or at steeper inclinations. However, it is not and may not be used because of the cost of initiating such a system where the experimentation charge cannot be spread over several mines, all of which later will be benefited by the improvement, if successful.

A chute with two manways is driven to the upper level and is kept full of broken coal until two other chutes are driven up on either side at least 25 or 30 ft., leaving no pillar between them and the central chute and each having only one manway. The two manways of the center chute are taken over by the adjoining breasts and filled with coal. When completed the coal is drawn from the chutes as backfilling is fed in from above. The refuse slides on the bottom slate more readily than on the top, so that the rock does not mix with the coal; practically all the coal is recovered. Other chutes are driven on either side until all the coal in the panel is removed.

#### Approach Through Rockholes

Approach to the chute at the bottom is by rockholes on about a 40-deg. pitch at 30-ft. centers, about 25 ft. below the coal bed, and at the top by a two-track rock tunnel. Three men should unload and place 200 to 250 cars of rock per shift. In each chute, except the first, which has a manway and airway against opposing pillars, there is but one opening provided. This is a manway which travels up alongside the pillar as far as the chute is driven, then across the chute to the manway of the next earlier chute, which by that time is being backfilled, ultimately reaching the airway above, which is connected with the aforesaid tunnel. Refuse is brought in by the tunnel, dumped on an end tip, and distributed by shaker chutes.

Panels would be 630 ft. long, allowing for 21 chutes, or breasts, 30 ft. wide, which would be satisfactory even where the roof is only fairly strong. Timber can be lowered from the upper level, instead of being raised from the lower level, greatly reducing labor. The breast can be shot with 9-ft. holes because the face is free at one end. Ventilation is provided by the manways, and air is not compelled to go up toward the upper level only to return to the lower level, for the ventilation is wholly ascensional.

With this system, overlying beds are not affected by subsidence, so the beds can be mined out of sequence—that is, in some other order than from top to bottom—making it possible to leave the thinner beds for later operation. The panel system gives maximum concentration, favoring efficient supervision, efficient timber and material distribution, efficient loading and haulage. With a balanced shaft or slope hoist, the breaker refuse descending will balance the coal cars on the ascent, and power will be saved. Men needed inside to place backfilling will release men on the surface now employed in rock disposal. Miners will be able to travel up to the top level or down to the bottom, thus giving them two methods of escape.

**● If a mine under breast-and-pillar working without backfill would yield 10,000,000 tons in its economic life with a capital expense of $1,000,000, for shaft and mine plant, declared Mr. Dierks, and a development cost of 25c. per ton, or $2,500,000—a total investment of $3,500,000—the amortization charge would be 35c. per ton exclusive of interest rates. If with the help of backfilling, yield of the mine could be increased 20 per cent, or 2,000,000 tons, actual benefit from this item alone would be 2,000,000 x 0.35 = $700,000.**

## Sink-and-Float Process Granted Patent

Six patents covering the sink-and-float process for the separation of minerals were granted on March 21 to E. I. du Pont de Nemours & Co., Wilmington, Del. (see *Coal Age*, May, 1938, p. 74). The patents cover the process and apparatus as a whole, including a phenomenon of physical chemistry termed "tough water." Company officials explained that tough water relates to extremely adherent and lasting water films discovered in the course of developing the sink-and-float process, which separates coal from slate. These films are only a few molecules thick, and the peculiar property of toughness of the water, according to the patents, is imparted by film stabilizers which otherwise are known as "active agents," of which starch acetate and tannic acid are examples.

The patents issued include the method of recovering the parting liquid, the actual step of separating the mineral from the worthless material, and the idea of using a moving stream of water above the parting liquid. Use of these agents in the production of coal of standard ash content also is covered.

## Illinois Bill Asks $300,000 For Coal Processing

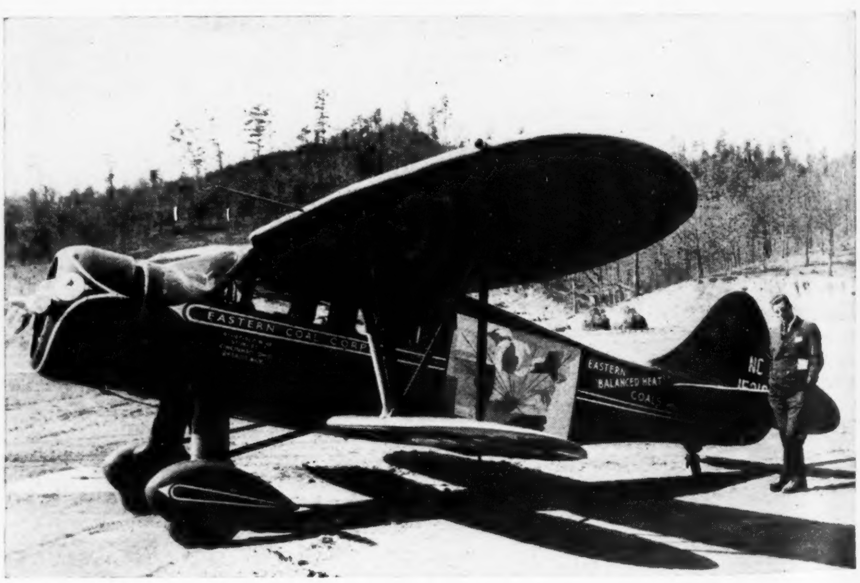
A bill to appropriate $300,000 for a smokeless coal study at the Illinois Geological Survey headquarters, at Urbana, has been presented in the State Legislature, at Springfield, by Representative Calvin D. Johnson (R.), of Belleville. The measure was presented following a recommendation by an advisory committee appointed by Acting Governor John Stelle. Part of the proposed appropriation would be used for erection of a research laboratory as a new unit of the Survey.

Much of the tonnage lost by Illinois coal could be regained, according to Director John J. Hallihan of the State Department of Registration and Education, if a method were found for processing it cheaply to meet the requirements of the St. Louis anti-smoke ordinance and other users of smokeless fuels. Dr. M. M. Leighton, chief of the State Geological Survey, pointed out that three types of smokeless fuel can be made from Illinois coal: coke, stoker fuel from crushed lumps, and smokeless briquets, but added that development of the last named had not been completed on a commercial scale.

## Flying Coal Representative

Eastern Coal Corporation, Bluefield, W. Va., has added a flying representative to its service in the merchandising of bituminous coal. For the inauguration of this unusual feature the company has employed Harvey A. Amos, a transport pilot with more than 4,000 hours of flying time to his credit, and has given him a thorough and intensive course in the

Flying coal representative and his winged chariot.



production and preparation of its product. He has been given the title of "flying representative" and will be sent to various points in a newly purchased Waco cabin plane to aid in the promotion of Eastern coal.

## All-Year Hot-Water System

A new system for providing year-round domestic hot water from the same equipment furnishing heat to the building in the winter has been perfected by the Spencer Heater Co., Williamsport, Pa. According to E. L. Buller, sales engineer, Anthracite Industries, Inc., the new system requires attention only two or three times a week for hot water during the summer, and but once or twice daily in winter for both heat and hot water. Draft and damper adjustments in summer are unnecessary, as automatic controls maintain constant hot water.

## *Industrial Notes*

FOSTER D. SNELL, INC., Brooklyn, N. Y., has absorbed the Kentucky Testing Laboratory, Lexington, Ky. The latter firm specialized in analysis of coal, water, building materials and similar lines; its equipment is being moved to the new headquarters and its personnel will become part of the Snell staff.

HORACE T. POTTS CO., Philadelphia, Pa., has added bronze products to its line of iron and steel products. The new line includes all sizes of bronze machine bearings, precision bronze bars, both solid and cored, as produced by the Bunting Brass & Bronze Co., Toledo, Ohio.

HERCULES POWDER CO., Wilmington, Del., has elected Charles A. Higgins as president. He has been with the company since 1915 and has been vice-chairman of the executive committee since 1933. He succeeds R. H. Dunham, who continues as chairman of the board and as chairman of the finance committee.

BUCYRUS-ERIE CO., South Milwaukee, Wis., has acquired exclusive manufacturing rights to the Ruth dredger, a machine for constructing and maintaining irrigation and drainage ditches. Henceforth the machine will be known as the Bucyrus-Ruth excavator and will be manufactured at South Milwaukee. Carl H. Wittenberg, vice-president of the Ruth organization, is making his services available to Bucyrus-Erie, and L. B. Schauer, formerly superintendent of the Ruth plant, has joined the Bucyrus-Erie factory organization. Fuchs Machinery & Supply Co., Omaha, Neb., has been appointed distributor for Bucyrus-Erie in its territory. Great Lakes Supply Corporation, Chicago, has been named as representative there.

THOMAS LAUGHLIN CO., Portland, Maine, has appointed the John E. Livingstone Co. as its representative in the Detroit (Mich.) area.

CLARKSVILLE MACHINE WORKS, Clarksville, Ark., manufacturer of stave and mining machinery, has changed its name from Clarksville Welding & Machine Works.

# Appalachian Wage Conferees Deadlocked On Closed Shop and Penalty Clause

AFTER AGREEING on a two-year renewal of the basic wage and hour provisions of the 1937-39 Appalachian contract, the joint scale committee of the operators and the United Mine Workers meeting in New York City struck a snag on the question of the closed shop. Finding the operators seemingly adamant in their refusal to write a closed-shop provision which would be acceptable to the union into the new agreement, Philip Murray, vice-president, United Mine Workers, at a reconvened session of the full joint conference offered to withdraw this demand if the employers would agree to eliminate the penalty clauses in district agreements. This the operators refused to do. Later they stated they were willing to recognize the United Mine Workers as the "exclusive bargaining agency" of the men under the National Labor Relations Act; the terms of this proposal, however, were declared unsatisfactory by John L. Lewis, president of the union.

As a result, the deadlock over the closed-shop and penalty-clause provisions, which first developed in the closing days of March, was still unbroken when this issue of *Coal Age* went to press on April 24. In the meantime, however, conciliators for the Department of Labor had stepped into the picture, Mayor La-Guardia of New York had addressed the joint subcommittee and then appealed to President Roosevelt to intervene. But the White House indicated that no direct Presidential participation or appeal would be forthcoming until the Department of Labor had exhausted its conciliation and mediation efforts. With reports that the coal stocks of scattered individual consumers, including certain government agencies, were dangerously low, the negotiations became front-page news for the metropolitan press.

Complete collapse of the negotiations on April 4 was averted only by the quick action of the operators. After battling hopelessly for several days on the twin issues of the closed shop and the elimination of the penalty clauses, a call went out for the reconvening of the full joint conference which had recessed on March 15, when consideration of the proposals of the union and the operators had been referred to a joint committee of 32, which, in turn, left the deliberations to a subcommittee of eight (*Coal Age*, April, 1939, p. 90). Addressing the joint conference at its morning session April 4, Mr. Murray summarized the 26 demands which had been presented on March 14 and concluded each summary with "and the operators said 'no'."

"The present position of the United Mine Workers," concluded Mr. Murray, "is not a demand upon the industry for a union shop but a forthright demand upon the industry for the elimination of the penalty clauses. We will take your old enabling clause; we will take a two-year contract, but you have got to eliminate the automatic penalty clause and no question about that. We are willing to assume full responsibility for that kind of a position. We want you to make that distinction and not indulge in misrepresentations in the public prints. I'm giving to you our official position; there should be no misunderstanding about that."

Beginning of the afternoon session was delayed for several minutes while the members of the operators' side of the subcommittee went into earnest huddles with one another and with other producers present. Then, while the press table was all set to hear a detailed reply to Mr. Murray's presentation of the morning, Charles O'Neill, president, United Eastern Coal Sales Co., and spokesman for the operators, moved that all the issues before the conference be referred back to the joint subcommittee of eight. Mr. Murray seconded the motion, the conference adopted it without a dissenting vote, and

Wide World

**Mayor LaGuardia Urges Miners and Operators to Agree**

New York executive asked negotiators to make a speedy settlement of new union contract, pointing out that the city faced a fuel shortage. Left to right: Charles O'Neill, spokesman for the operators; Walter L. Robison, chairman of the conference; Mayor LaGuardia, and John L. Lewis, miners' union president.

the arguments behind closed doors were resumed the next morning.

On April 13 Mayor LaGuardia met with the subcommittee to discuss the threatened shortage for coal for some of the municipal activities. Seeking to break the deadlock on the penalty clause, he proposed that its infliction in each case be subject to the decision of a joint arbitration board of operators and miners. Two days later the Mayor appealed to the President to use his good offices to effect a speedy settlement of the controversy. Stating that an emergency confronted the City of New York and that every other city in the East would soon face a similar situation, he wired, "I respectfully request that you use your good offices in bringing the two parties together." In all his years of experience in labor disputes, he stated, "I have never attended a conference where the two sides seem to be less apart. There is no dispute as to wages or working conditions."

The operators' proposal to recognize the Lewis union as the joint bargaining agency was made on April 14. The text of this proposal reads as follows:

"We offer to make an Appalachian basic wage agreement and the usual district agreements for two years from April 1, 1939, specifying that each operator represented in the Appalachian conference recognize the United Mine Workers of America as the exclusive bargaining representative under the National Labor Relations Act of such operator's employees of the classes covered by the agreements, except the employees exempted under such agreements, and specifying further that as a condition of employment each operator will require such employees to be bound by such collective bargaining agreement; rates of pay, hours of labor and all other conditions of employment to be the same as provided in the agreements that expired March 31, 1939."

#### Echo of Lewis-Green Imbroglio

The union position is a direct outgrowth of the C.I.O.-A.F.L. fight. It was made clear in Mr. Murray's speech on April 4 that the United Mine Workers were demanding either the protection of the closed shop or the freedom of action to meet raids—presumably by the Progressive Mine Workers of America—which the elimination of the penalty clauses would give the Lewis group. The proposal of April 14, declared the operators, "gives to Mr. Lewis all the legal protection for his union" from such raids "that the operators can afford to give him under the provisions of the National Labor Relations Act. It means that for the period of the contract no group of employees, whether union or outside of any union, can ask the operators or require them under the provisions of the act to bargain with them. It may not prevent efforts to form groups of other unions among the mine workers, but no provision of the National Labor Relations Act can prevent such attempts even under a closed-shop agreement."

The employers, however, did not intend to act "as recruiting sergeants" for the United Mine Workers. Neither would they grant the closed-shop demand because that would be a surrender of rights which management must retain if it is to

### Permissible Plates Issued

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in March, as follows:

E. I. du Pont de Nemours & Co.: cartridge pump; 5-hp. motor, 230 volts, d.c.; Approval 366; March 7.

Chicago Pneumatic Tool Co.: No. 571 hand-held drill; 250 volts, d.c.; Approval 367; March 20.

Joy Mfg. Co.: Type 12-BU-5 (Joy Jr. low-pan) loading machines; five 3-hp. motors, 220-440 volts, a.c.; Approvals 368 and 368A; March 24.

---

function efficiently. "The operators must be free to direct their working forces in order to maintain the discipline and safety standards necessary for efficient operation. To adopt the closed shop would eliminate from employment the members of rival unions and men who prefer to belong to no union and would force all employees to become and remain members of the United Mine Workers and pay dues and assessments in order to hold their jobs."

That outside interests have been responsible for the deadlock—a charge made by the Secretary of Labor and reiterated by Mr. Murray—was publicly and privately denied by operators. "So far as the subcommittee is concerned," stated Mr. O'Neill on April 12, "outside influences have had no effect upon it. To what extent this has been a factor in this conference, the subcommittee is not informed and is not swayed by it." Operators accused of a desire to weaken the Lewis organization also have declared that accusation false; their opposition to the closed shop, they insist, is based solely on their unwillingness to "turn over the management" of the mines to the union.

#### Shortage Reports Exaggerated

Despite reports of shortages, the National Association of Purchasing Agents estimated that industry had 42 days' supply of coal on hand as of April 1, distributed as follows: electric utilities, 84 days; byproduct coke ovens, 50 days; steel and rolling mills, 36 days; coal-gas retorts, 48 days; cement mills, 50 days; other industries, 34 days; railroads, 32 days. On April 18, however, the Baltimore & Ohio R.R. reported that it was down to a week's reserve. Although there were some reports of foreign buying by Eastern utilities and of movement of Illinois and Indiana coal to Ohio and New York, the first fortnight in April found many mines outside the Appalachian area without enough business to assure full running time. These mines and others now operating under temporary agreements pending the signing of a new Appalachian contract are to close down on May 4 or 5 unless the deadlock is broken in the meantime; union officials in these districts notified operators to that effect, according to an admission by Vice-President Murray at the April 20 conference. Threat of cessation of work at Pennsylvania anthracite mines also impends; the present agreement in that field expires April 30. The hard-coal mines resumed a five-day work week on April 17.

The Progressive group has continued the policy—inaugurated several weeks ago —of serving formal notice on operators

in various fields that "to the best of our knowledge and belief, the Progressive Mine Workers represents a majority of your employees" and that if the operator addressed continues "to bargain with a group representing what we believe to be a minority of your employees, you will be cited for violation of the National Labor Disputes Act." To further complicate the situation, a campaign has been started to organize locals of the "Captive Coal Mines Union," said to be an affiliate of the A.F.L. The first local in this group was organized late in March at one of the Tennessee Coal, Iron & Railroad Co. mines in Alabama by absorbing the membership of the former Brotherhood of Mine Workers of Captive Mines—Coal Mines Division.

Representatives of producers and U.M.W. members from the anthracite region of Pennsylvania met April 18 in the Engineering Societies Building, New York City, to begin negotiation of a new wage contract to replace the one expiring on April 30. The miners' scale committee proposals included the following: a six-hour work day, five-day week, with the same pay for six hours that they have been getting for seven hours, plus a nominal increase; equal division of working time; time and a half for overtime; double time for Sundays and holidays; establishment of seniority rights; abolition of the contract system; abolition of physical examinations; two weeks vacation with pay; guarantee of 200 working days each year; regulation of the practice of companies leasing their property in such manner as will protect the wages of miners; contract for a period of two years.

Operators chosen as negotiators are: W. W. Inglis, president, Glen Alden Coal Co. (chairman); R. E. Taggart, president, Philadelphia & Reading Coal & Iron Co.; J. B. Warriner, president, Lehigh Navigation Coal Co.; L. R. Close, president, Lehigh Valley Coal Co.; James Prendergast, president, Susquehanna Collieries Co.; J. H. Pierce, president, East Bear Ridge Colliery Co.; Santo Volpe, president, Volpe Coal Co.; C. A. Garner, vice-president, Jeddo-Highland Coal Co., and J. William Wetter, president, Colonial Colliery Co.

Representatives of the United Mine Workers included: John L. Lewis, international president; Philip Murray, vice-president; Thomas Kennedy, secretary-treasurer; Michael J. Kosik, president, District 1; Hugh V. Brown, president, District 7; and Martin F. Brennan, president, District 9. John Boylan, U.M.W., was named permanent secretary of the joint conference.

## Personal Notes

W. M. BLACK has been promoted to assistant mine foreman at Powelltown No. 7 mine of the Koppers Coal Co., Fayette County, West Virginia.

JOHN C. COSGROVE, JR., who had been connected with the Koppers Coal Co. at Mount Hope, W. Va., since his graduation from Pennsylvania State College, has taken up his duties as mining engineer with Sub Nigel, Ltd., Transvaal, South Africa.

R. T. DANIEL, president of the National

Coal & Coke Co., Birmingham, Ala., has been appointed a member of the committee on agricultural cooperation of the Association of Manufacturers.

Oral Daugherty has resigned as general superintendent for the Sunday Creek Coal Co., Nelsonville, Ohio, to assume operation of the Carbondale Coal Co. property, which he has purchased. The Sunday Creek company had owned and operated the property for the last three years.

John S. Forman has been promoted to vice-president and general manager of the Mount Olive & Staunton Coal Co., Staunton, Ill., vice J. Louis Reiber, now president.

L. Ebersole Gaines, of Fayetteville, W. Va., was elected on April 4 as president of the New River Co., Mount Hope, W. Va., vice Robert H. Gross, resigned. Mr. Gaines, an attorney, has been vice-president and director, with general administrative duties in operations and sales, of the Amherst Coal Co., Amherst Fuel Co., Logan County Coal Corporation, Star Coal & Coke Co., and Buffalo Creek Coal & Coke Co., all in West Virginia.

Robert G. Graham, president of the Kemmerer Gem Coal Co., Norton, Va., has been elected to the board of directors of the Virginia State Chamber of Commerce.

H. L. Griffin, recently associated with Paul Weir, consulting engineer, Chicago, has joined Heyl & Patterson, Inc., Pittsburgh, Pa., as preparation engineer. For ten years he was chief engineer for the New England Fuel & Transportation Co. and division engineer for its successor, the Koppers Coal Co., in northern West Virginia. He is a member of the executive committee, Coal Division, American Institute of Mining and Metallurgical Engineers, and also served for a number of years on the preparation committee of the American Mining Congress.

Robert H. Gross tendered his resignation in March as president of the New River Co., Mount Hope, W. Va., and as first vice-president of the White Oak Coal Co., selling division. At the same time he announced that he would not be a candidate for reelection. He succeeded to these posts on the demise of S. A. Scott, a few months ago.

Allen J. Johnson, director of the Anthracite Industries Laboratory, Primos, Pa., has been reappointed by the American Institute of Mining and Metallurgical Engineers as vice-chairman of the committee on utilization of fuels, and as a member of the committee on research and the A.S.M.E.-A.I.M.E. committee on fuel values.

C. R. Nash has resigned as vice-president of the Pittston Co., Scranton, Pa., effective April 1.

J. Louis Reiber has been advanced from vice-president to president of the Mount Olive & Staunton Coal Co., Staunton, Ill., effective April 1.

Jack Schroeder, traffic manager for the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., has been reelected general secretary of the Southeast Shippers Advisory Board.

Walter E. Smith, Cambridge, Ohio, has been named chief of the State Divi-

sion of Mines by Governor Bricker of Ohio. He was at one time chief under a former administration.

SHERWOOD SPARKS has been advanced to general mine foreman at No. 3 mine of the Carbon Fuel Co., Carbon, W. Va.

C. C. VIRGIN has been appointed superintendent at Golden Ridge No. 6 mine of the Minds Coal Mining Corporation, Monterville, W. Va.

A. W. VOGTLE, sales and traffic manager of the DeBardeleben Coal Corporation, Birmingham, Ala., has been reelected general chairman of the Southeast Shippers Adivsory Board.

## St. Louis Smoke Study Gets WPA Grant

Continuation of the study of smoke conditions in St. Louis, Mo., has been made possible by a Works Progress Administration grant of $35,000, according to an announcement by Representative Thomas C. Hennings, Jr. This fund will finance the survey through next season, said Raymond R. Tucker, City Smoke Commissioner. Thus far, the work has been concentrated largely in industrial areas, but hereafter crews will devote more attention to residential districts.

The project employs about twenty workers who tabulate information on density and volume of smoke to determine possible violations of the anti-smoke ordinance. From these data the Commissioner is able to compile and classify information for guidance in eradication of smoke. A report issued by the Commissioner last June showed that during the winter of 1937-38 there was a reduction of 11.65 per cent in smoke from commercial buildings and a cut of 3.99 per cent in residential smoke. The figures were based on 6,253 observations of all types of smoke sources in the city.

Mayor Dickmann has signed an ordinance prohibiting the sale in St. Louis of coal more than 6 in. in diameter. The measure will take effect July 1, 1940.

A group of industrialists, business and professional men have organized to undertake a solution of the St. Louis smoke problem, according to Charles J. Colley, power engineer for the Monsanto Chemical Co. Southern Illinois coal operators were to be asked to join the committee, it was announced, and a $50,000 fund sought to study the problem in order to develop (1) a method of processing Illinois coal to provide a smokeless fuel that can be sold for domestic use at the present price of cheap coal, and (2) a plan for financing a self-supporting municipally operated plant for coal processing. Mr. Colley estimated that an original investment of $10,000,000 would be necessary to establish the coal-processing plant.

## *Obituary*

HENRY WARRUM, 73, general counsel for the United Mine Workers, died April 18 at the Emergency Hospital, Washington, D. C. The "Judge" had been attorney for the union for 40 years and also assisted in framing the bituminous coal control act, the National Industrial Recovery Act and the National Labor Relations Act.

Dr. Thomas S. Baker

DR. THOMAS S. BAKER, 68, president emeritus of Carnegie Institute of Technology, Pittsburgh, Pa., died April 7. He had suffered a stroke early this year and had had a similar attack last October. He was president of Carnegie Tech from 1922 to 1935, when he retired. He gained wide recognition through the promotion of international coal conferences in 1926, 1928 and 1931. While arranging for these conferences he traveled extensively in Europe and succeeded in bringing leading coal technicians of many nations to the Pittsburgh meetings.

GEORGE CARSON SCARBOROUGH, 55, mining engineer for the Wise Coal & Coke Co., died April 7 at his home in Norton, Va., of pneumonia and heart complications after an illness of less than a week.

DR. C. G. ELLISON, 77, vice-president of the Mahan-Ellison Coal Corporation and a director of the Southern Harlan Coal Co., died April 9 at his home in Williamsburg, Ky.

RAYMOND L. NULLMEYER, 39, mining engineer for the Crescent Mining Co., Peoria, Ill., died March 25 following eight weeks' illness with a kidney ailment. He became associated with the Crescent Coal Co. in 1920 and continued as engineer with the Crescent Mining Co. when it was formed in 1930.

FRANK FARRINGTON, 66, well-known Illinois mine union leader, died in his home in Streator, Ill., on March 30 following a heart attack on March 27. He had been president of District 12, United Mine Workers, from 1914 to 1926, when he was deposed from union office following his acceptance of a long-term contract with the Peabody Coal Co. to handle labor relations at a salary of $25,000 a year. He also served six years as a member of the international board of the union. In recognition of his work, President Wilson appointed him to a commission to study labor conditions in Europe. In early life he worked many years in the mines at Streator.

DR. J. H. MCCULLOCH, president and general manager of the Lillybrook Coal Co., Beckley, W. Va., died March 18 of a fractured skull, the result of a fall on

the steps of the Black Knight Country Club. Dr. McCulloch acquired the interest of J. A. Hunt in the Lillybrook company only a few months ago, advancing from the vice-presidency at that time.

## New River Buys Price Hill

New River Co., Mount Hope, W. Va., purchased the Price Hill Colliery Co. properties at Price Hill, W. Va., early in April at receivers' sale. The transaction included tipple, company houses and 2,500 acres of coal land. The mine closed in May, 1938, and a New River official said it would not be reopened but would be worked from the new owner's adjacent Cranberry operation.

## Coal-Mine Fatality Rate Continues to Taper

Accidents at coal mines in the United States caused the deaths of 62 bituminous and 17 anthracite miners in February last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 33,910,000 tons, the death rate among bituminous miners was 1.83 per million tons, compared with 2.51 in the corresponding month of last year.

The anthracite fatality rate in February last was 4.14, based on an output of 4,111,000 tons, as against 7.38 in the second month a year ago.

For the two industries combined, the death rate in February last was 2.08, compared with 3.10 in February, 1938.

Fatalities during February last, by causes and States, as well as comparable rates for the first two months of 1938 and 1939, are shown below:

UNITED STATES COAL-MINE FATALITIES IN FEBRUARY, 1939, BY CAUSES AND STATES

| | Underground | | | | | | | | Open-cut and Surface | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | Falls of Roof | Falls of Face | Haulage | Explosives | Electricity | Other Causes | Total underground | Shaft | Mine cars | Railway cars | Other Causes | Total Surface | Grand Total |
| Alabama | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 |
| Arkansas | 2 | .. | 1 | .. | .. | .. | 3 | .. | .. | .. | .. | .. | 3 |
| Colorado | .. | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | 1 |
| Illinois | 3 | .. | 1 | .. | .. | .. | 4 | .. | .. | 1 | .. | 1 | 5 |
| Indiana | 3 | .. | .. | .. | .. | .. | 3 | .. | .. | .. | .. | .. | 3 |
| Iowa | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 |
| Kentucky | 5 | .. | 1 | .. | 2 | .. | 8 | .. | .. | .. | .. | .. | 8 |
| Ohio | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 |
| Pennsylvania (bit.) | 3 | .. | 4 | .. | 1 | .. | 8 | .. | .. | .. | 1 | 1 | 9 |
| Tennessee | 3 | 1 | .. | .. | .. | .. | 4 | .. | .. | .. | .. | .. | 4 |
| Virginia | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 |
| West Virginia | 15 | 1 | 6 | .. | 1 | .. | 23 | .. | 1 | 1 | .. | 2 | 25 |
| Total (bituminous | 38 | 2 | 13 | .. | 5 | .. | 58 | .. | 1 | 2 | 1 | 4 | 62 |
| Pennsylvania (anthracite) | 6 | 3 | .. | 3 | 1 | 2 | 15 | 1 | .. | .. | 1 | 1 | 17 |
| Grand total | 44 | 5 | 13 | 3 | 6 | 2 | 73 | 1 | 1 | 2 | 2 | 5 | 79 |

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January and February, 1938 and 1939

| | Bituminous | | | | Anthracite | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number Killed | | Killed per Million Tons | | Number Killed | | Killed per Million Tons | | Number Killed | | Killed per Million Tons | |
| Cause | 1938 | 1939 | 1938 | 1939 | 1938 | 1939 | 1938 | 1939 | 1938 | 1939 | 1938 | 1939 |
| Falls of roof and coal | 82 | 70 | 1.404 | 1.008 | 35 | 24 | 4.190 | 2.648 | 117 | 94 | 1.753 | 1.198 |
| Haulage | 31 | 22 | .531 | .317 | 6 | 2 | .719 | .221 | 37 | 24 | .554 | .306 |
| Gas or dust explosions: | | | | | | | | | | | | |
| Local | 5 | 2 | .086 | .029 | ... | ... | ..... | ..... | 5 | 2 | .075 | .025 |
| Major | 15 | ... | .257 | ..... | ... | ... | ..... | ..... | 15 | ... | .225 | ..... |
| Explosives | 2 | ... | .034 | ..... | 2 | 8 | .239 | .882 | 4 | 8 | .060 | .102 |
| Electricity | 6 | 11 | .103 | .159 | ... | 1 | ..... | .110 | 6 | 12 | .090 | .153 |
| Machinery | 5 | 5 | .086 | .072 | ... | ... | ..... | ..... | 5 | 5 | .075 | .064 |
| Shaft | 2 | ... | .034 | ..... | ... | 2 | ..... | .221 | 2 | 2 | .030 | .025 |
| Miscellaneous | 4 | 1 | .068 | .014 | 2 | 3 | .239 | .331 | 6 | 4 | .090 | .051 |
| Stripping or open-cut | 1 | 1 | .017 | .014 | 7 | 1 | .838 | .110 | 8 | 2 | .120 | .025 |
| Surface | 6 | 6 | .103 | .086 | 1 | 3 | .120 | .331 | 7 | 9 | .105 | .115 |
| Total | 159 | 118 | 2.723 | 1.699 | 53 | 44 | 6.345 | 4.854 | 212 | 162 | 3.177 | 2.064 |

* All figures subject to revision.

## Alabama Rate Cuts Approved

Coal freight rate reductions ranging up to 40 per cent to points within 125 miles of Alabama coal fields were approved April 6 by the State Public Service Commission. A commission announcement said the cuts, effective April 12, were proposed by railroads "after conferences between coal operators in an endeavor to meet truck competition and competition from other fuels that do not move by rail."

## New Preparation Facilities

Dawson Coal Co., Clarksburg, W. Va.: Contract closed with Fairmont Machinery Co. for conveying and crushing equipment; capacity, 250 tons per hour; to be completed about May 10.

Ebensburg Coal Co., Colver, Pa.: Contract closed with the Jeffrey Mfg. Co. for all-steel four-track tipple to handle mine-run, machine-cuttings and mine rock. Capacity is 525 tons of coal per hour, and the installation includes dumping equipment, inspection facilities, 125-ton cuttings bin, screening units, including a bank of five Jeffrey-Traylor vibrators, Bradford breaker, mixing conveyor and other necessary equipment and auxiliaries. The plant is to be completed about Oct. 1.

## Standard and Code List Out

The new annual list of American Standards and Safety Codes was issued late in March. The list includes about 400 nationally approved standards, safety codes, and specifications indexed alphabetically and also industrially according to subject. These cover work in the fields of mining, civil engineering, mechanical engineering, electrical engineering, automobile and aircraft, transportation, ferrous metallurgy, non-ferrous metallurgy, chemical industry, textiles, wood, paper and pulp, petroleum products, symbols and abbreviations, etc.

In each case these standards represent general agreement on the part of maker, seller, and user groups as to the best current practice in the industries or processes that the standards cover. More than 600 trade, technical, and government groups have taken part in this work. The list may be obtained free of charge by writing to the American Standards Association, 29 West 39th St., New York City.

## *Trade Literature*

Alloys—Haynes Stellite Co., Kokomo, Ind. Booklet on Haynes products contains tables presenting the physical, mechanical and chemical properties of the company's principal alloy products, together with a brief description of each.

Boilers—Combustion Engineering Co., Inc., New York City. Catalog No. BT-6 (40 pp.) covers bent-tube units, including 2-, 3- and 4-drum types, together with numerous setting arrangements. Particular attention is given to features of the 3-drum design, with 25 setting drawings, as well as many photographic illustrations showing furnaces, boiler details, construction views and manufacturing operations.

Boiler Service Pumps—Roots-Connersville Blower Corporation, Connersville, Ind. Bulletin Form B14-HB announces a new line of horizontal units, rounding out a service for boilers up to 500 hp. at pressures up to 150 lb.

Cable—Anaconda Wire & Cable Co., New York City. Folder calls attention to the suitability of ANW insulated cables for commercial and industrial applications in moist and other adverse conditions where heretofore only lead-sheathed cables had been considered applicable.

Cable—General Cable Corporation, New York City. Folder gives engineering analysis of Super Service cords and cables.

Centrifugal Pumps — Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin W-321-B13 describes forged-steel-casting units for application to high-pressure steam-generating units. Section and dimension charts, with specifications, are shown.

Compressors—Ingersoll-Rand Co., Phillipsburg, N. J. Catalog Form 3063-A (28 pp.) is devoted to the "ES" line, including sizes from 10 to 125 hp. and pressures from 5 to 2,500 lb.; of the double-acting horizontal crosshead type, designed to run at moderate speeds in heavy continuous service. Four pages illustrate service in different industries.

Diesel Tractors—Caterpillar Tractor Co., Peoria, Ill. Bulletin Form 5205 discusses the mechanical features of tractors, engines and road machinery. Separate sections are devoted to individual features showing how each one affects the

working ability and life of the machine.

Electrical Ground Rods—Anaconda Wire & Cable Co., New York City. Publication C-14 gives six important features of Anaconda Star ground rod, as well as engineering data on grounding, including its purpose and methods, earth characteristics, and methods of measuring ground resistance.

Electric Motors—Louis Allis Co., Milwaukee, Wis. Bulletin No. 515 lists 26 different types of motors and checks the proper type recommended for about 50 standard applications. Bulletin No. 610 is a condensed booklet including general information on NEMA standards and definitions, with suggestions for proper selection of motors, types of drives, various types of protected motors and their definitions; information regarding service factors, rated loads, torques and other important reference information. Bulletin No. 508E announces a new line of a.c. and d.c. explosion-proof motors, stressing important features.

Eyeshields—Jackson Electrode Holder Co., Detroit, Mich. Folder describes and pictures a number of models, besides citing industries as well as sports in which they may be used.

Lead-Bearing Steels—Joseph T. Ryerson & Son, Chicago. Bulletin notes advantages of Ledloy steel, including results of actual machining tests.

Liquid-Rubber Primer — Self-Vulcanizing Rubber Co., Inc., Chicago. Booklet (16 pp.) details the advantages of the Selfvulc process in defeating the inroads of corrosion and abrasion in metals, concrete, glass, tile and brick.

Motors and Generators—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Leaflet 2125-C cites features of explosion-proof motors for use in explosive, fume-laden atmospheres, including construction and installation views. Leaflet 2183-A describes Type E "Lo-Maintenance" direct-current motors and generators.

Self-Dumping Bucket Carrier—Link-Belt Co., Chicago. Catalog No. 1720 (24 pp.) is devoted to the Peck overlapping pivoted bucket carrier for handling, elevating and conveying coal, ashes and other materials.

Starters and Resistors — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Descriptive Data 11-200 covers Type F non-reversing linestarters. Descriptive Data 31-600 describes stainless-steel outdoor grounding resistors. Descriptive Data 9600 details features of d.c. magnetic crane controllers.

Track-Mounted Loader—Myers-Whaley Co., Inc., Knoxville, Tenn. Catalog (16 pp.) describes and illustrates the Whaley "Automat" for coal loading underground. Operating data and general specifications are given.

Valve—Manning, Maxwell & Moore, Inc., Bridgeport, Conn. Bulletin contains information about Hancock Duravalves, giving a list of installations and test reports, as well as other engineering data.

Vibrating Screens—Productive Equipment Corporation, Chicago. Bulletin 239 explains outstanding features of Selectro screens with strokes adjustable to eight distinct intensities.

# LETTERS
# *To The Editor*

## Keep It From Breaking

The roof condition described by John Buggey in his letter in the March *Coal Age* (p. 78) reminds me of similar conditions which I have met and given considerable thought to. I don't know that I have discovered the real cause of this condition but I have formed opinions as to what I would do to prevent as far as possible the costly consequences. I agree with Mr. Buggey in making the track-side rib the safety line, as I take it for granted that pillars are extracted retreating—not often done in my own State of Indiana.

With the rib definitely fixed as the safety line, I would place iron or steel straps, say, 5 in. wide, ½ to 1 in. thick and 9 ft. long across the track, letting one end of each strap rest in slots cut in the rib. In entries, I would do the same thing, except that both ends of the straps would be set in the coal. Furthermore, I would set good props under the straps, one on each side of the track, as close as clearance regulations would permit. The straps would be light and easy to handle and their long life would compensate for their probable greater first cost.

The straps would give some under the roof but still would be able to bear a considerable load, whereas wood bars probably would break. And while the initial giving of the roof might be unnoticeable to the eye, it will take place. But we must timber and prevent the roof from caving, and in this connection we may assume that that part which already has moved, if brought to rest, will, in a measure, protect the remainder against the effects of air. Incidentally, I am convinced that there is an affinity between roof and air, as witness the many statements to this effect. If I could not get iron or steel straps, I would use good 1x8-in. boards, without knots, rather than the heavier, comparatively rigid wood bars.

For the time being, however, I most assuredly would set rib-side props with cap pieces 2 to 3 in. thick and 18 in. long, with one end of each cap piece actually touching the rib, then adopt the principle of cushioning the first give of the roof and arresting its movement before it actually breaks, getting the full benefits of the idea of insulation, or the principle of guniting. But in all events, I advocate supports along the rib, even if it should be necessary to spread out the remainder, although the roof really is very lightly supported at present.

W. H. Luxton
*Linton, Ind.*

## Against Reciprocal Buying

Under the attack on business by the present administration we manufacturers like to feel that we are martyrs. We know the attack is unjustified, in general. Government, however, has uncovered some abuses which are real enough to justify action in some cases.

One of these abuses which as yet has not been the subject of regulation, but which will and perhaps should be, is that of reciprocal buying. This exploded theory is continued only because of its age, not because anyone in industry finds it a satisfactory method of placing business.

Industry, at great expense, sets up a purchasing department, an inspection department and an engineering department, to produce material of proper price and quality. After having done this they put in a reciprocal relations department who override the decisions of the buyer, the inspector and the engineer, and place business merely because of the suppliers' results in frequent strained industrial relations, since no one can buy a volume to satisfy the reciprocator. Not only that, but the distribution is never fair from the seller's point of view.

Reciprocal buying results in higher prices, since the reciprocator cannot get the best price available. It results in lower quality, since the reciprocator cannot insist on quality. It results in lack of standardization which enormously increases cost of upkeep.

I can see the joy with which a LaFollette, or a Roosevelt, or other muckrakers, will pounce on this industrial foible to show how incompetent is the management of American business. With that proof the New Deal can show it is necessary for government to guide, direct and protect industry, and thus only can it be kept solvent. As a matter of fact, who can show that government is not right in such conclusions? Result: One law, a million new jobs and a billion new taxes.

The worst of it is that in this case the government would have a perfectly clear case to prove its point. No one could take the untenable position that reciprocal buying is anything but asinine and wasteful. However, in the hands of governmental regulation for its elimination, a waste will be turned into regimentation from which industry perhaps can never recover.

J. F. Lincoln
*President, Lincoln Electric Co.*
*Cleveland, Ohio*

## Correction

In a letter to the editor entitled "Should Coal Favor Oil," by W. Wallace Dartnell, which appeared in our April issue (p. 106), there was an unintentional omission of eight words which may have beclouded Mr. Dartnell's meaning and caused confusion to our readers. The last sentence of the second paragraph in the third column read as follows: "The well-managed mines with favorable mining conditions will have the advantage of cost and, indirectly, the selling prices and will put the coal production in the hands of responsible [companies instead of in the control of irresponsible] organizations who have been in bankruptcy so many times that they know the ins and outs of the bankruptcy laws better than the lawyers." The words within brackets are the ones that were omitted."—The Editor.

# WHAT'S NEW

## *In Coal-Mining Equipment*

### ROOF JACK

To meet the new safety regulations recently inaugurated in mechanical-mining operations, Duff-Norton Mfg. Co., Pittsburgh, Pa., has introduced a new all-steel roof jack featured by a conveniently located slide handle which not only permits easy operation in cramped quarters but also provides greater leverage in shoring up mine roofs, timbers or steel I-beams. These jacks are equipped with any one of the three types of heads and are manufactured in several standard heights and capacities. The standard, or swivel-type, head is designed for direct contact with the roof, while the other two types are made for round timbers or I-beams.

### RELAY

An improved relay of the "polarized field - frequency" type for controlling the application and removal of d.c. field excitation for synchronous motors has been developed by the Electric Machinery Mfg.

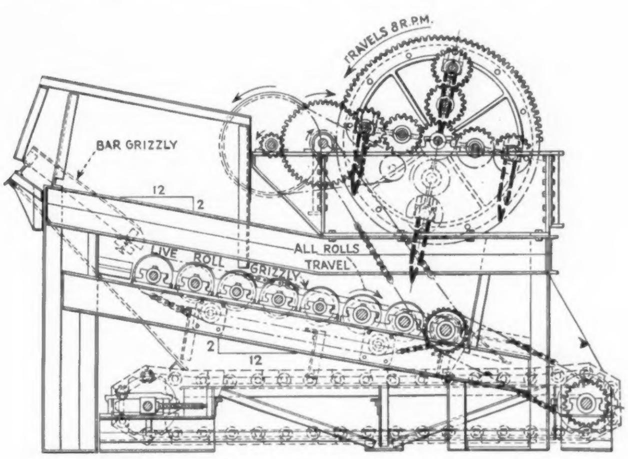
Co., Minneapolis, Minn. This relay, it is stated, makes it possible to apply field excitation at the most favorable angle between the stator and rotor poles to pull the rotor into synchronism promptly without slippage. Should a momentary voltage dip or overload pull the motor out of step, the relay removes excitation automatically, allowing the motor to resynchronize and thus avoiding shutting it down. Backlash in the driven machinery is eliminated and line disturbance is reduced, it is asserted.

### SAFETY TREADS

American Abrasive Metals Co., Irvington, N. J., offers abrasive safety treads and walkways of "Feralun" for installation in either old or new structures. This material consists of cast iron in the surface of which are embedded grains of an abrasive material. For decorative uses where a variety of colors is desired, "Bronzalun," "Alumalun" and "Nicalun" types are available.

### ROTARY PICK BREAKER

United Iron Works Co., Kansas City, Mo., has developed a rotary pick breaker designed to size mine-run or prescreened coal to any desired size without excessive degradation and fines. According to the manufacturer, the continuous rotary motion, without intermittent stopping of the coal, and the vertically maintained picks give large capacity and accurate sizing with small power consumption. The small coal is bypassed the breaker teeth by the bar and live-roll grizzlies, preventing crushing. The breaker teeth, after splitting, push the broken-to-size coal off the grizzly rolls, preventing further breaking or crushing, and the coal is lowered to the conveyor on inclined skids. Multiple heads and picks will produce any desired size.



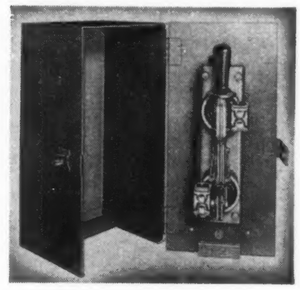

### POTENTIAL INDICATOR

Ideal Commutator Dresser Co., Sycamore, Ill., has introduced the Ideal Hi-volt indicator which shows the presence of potential when held in the changing static field such as is found surrounding static from belting, a.c. circuits, pulsating direct current, condenser discharges, etc. The glow

tube lights up instantly in a changing static field; it is not necessary to touch the conductor carrying the potential. According to the maker, it gives positive indication on 2,000 volts and up in several times the flashover distance on non-insulated conductors. Handy and compact, it is equipped with a clip and can be slipped into the vest pocket.

### QUICK-BREAK SWITCH, FUSED TROLLEY TAP

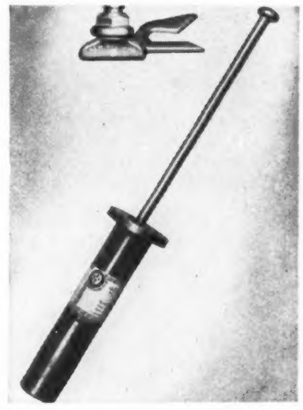
Ohio Brass Co., Mansfield, Ohio, has developed a new standard quick-break switch for circuits of 110-750 volts. Designed for use in railway and mine, trolley and feeder circuits or in any other circuits where a quick, wide break is desired, says the manufacturer, the new switch takes advantage of the durability and dielectric strength of Di-



rigo molded insulation. The switch supports are mounted on two O-B universal-2 mine hangers. The hangers, in turn, are mounted on a rust-proof hot-dip galvanized-steel base. Type HMC is protected by a heavy steel case which can be locked so that access to the switch and its operation is impossible; Type HM is furnished without the case.

Blades and jaws of these switches are of hard cold-rolled copper of ample cross-section for rated capacities. The cable is gripped by adjustable clamps which tighten by means of two steel setscrews. Furnished with soft rubber handle for protection of the operative, the switches are available in capacities from 400 to 1,500 amp.

The O-B Type G fused trolley tap, says the company, can now be furnished with a contact ball nip. For use with

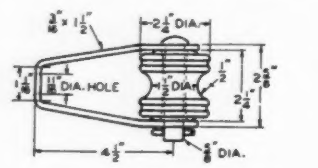


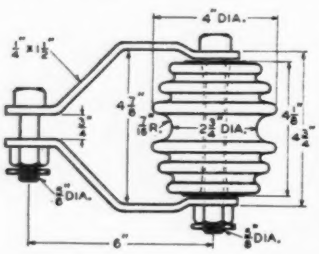
an especially designed Bulldog clamp, this combination is said to eliminate effectively the danger of accidentally catching the tap in the trolley-line equipment while nipping machines and locomotives in

room work. By means of the Bulldog clamp the device is immediately converted to a foolproof trolley-tapping arrangement at the room turnout as the motor or machine proceeds on cable reel into the room.

The clamp has a special jaw which is extended in the form of a fork. When the room is reached, the machine or motor operator simply flips the balled end of the tap into this fork, where it stays snugly in place while the machine or motor proceeds on cable reel into the room. When the machine or motor emerges from the room, the ball will easily disengage from the forked clamp jaw.

Three types of insulated clevis assemblies, designed for various applications on distribution lines, also are offered.

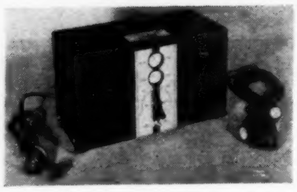




One type, having a $2\frac{1}{4}$-in. spool insulator held by a $4\frac{1}{2}$-in. clevis, is for dead-ending and corner construction on secondary circuits. The other two types have a spool insulator $4\frac{1}{8}$ in. long and are suitable for primary circuit dead-ends and other applications. One of the larger-spool assemblies has a closed clevis for through or cross-arm bolt mounting. The other has a split clevis with attachment bolt which permits it to be fastened with an eyebolt, hook or cable, or to be bolted directly to the supporting piece.

### WELDING CONTROL

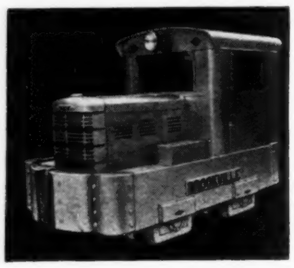
A. O. Smith Corporation, Milwaukee, Wis., offers the new "Arc Length Monitor" for assuring uniformly high-quality welds by keeping the operator continuously informed as to the length of the arc. This is done by means of two tiny bulbs mounted inside the welding helmet, one on each side of the viewing window. Both bulbs are normally dark at the selected voltage. The one to the right glows faintly when the voltage increases, and the one to the left when it decreases. The instrument it-



self, which contains signal lights similar to those in the helmet, is placed where it can be observed by the production or welding supervisor. The control, according to the company, is particularly valuable when welding light-gage material and also is useful in checking the ability of old operators or training new ones.

### FORD-POWERED LOCOMOTIVE

Units powered with 85- and 95-hp. engines have been added by the Brookville Locomotive Co., Brookville, Pa., to its line of Ford-powered industrial locomotives, with models now ranging from $2\frac{1}{2}$ to 8 tons in size, in any gage. Equipped with an all-speed reverse, making all forward speeds available in either direction, they



have a dual-spring journal suspension, making high speeds possible over poor track. With the complete power plant made by the Ford Motor Co., it can be serviced at any authorized Ford service station and, according to the manufacturer, all models have powerful chassis and steel frame. For service in localities where gasoline is relatively expensive, the Ford V-8 engine can be replaced with diesels in many models.

### BLUEPRINT MACHINE

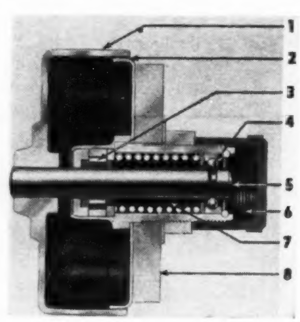
A portable blueprint machine, known as the Elpro Printer, for reproducing drawings of limited size, has been brought out by the Eltronic Products Mfg. Corporation, Ann Arbor, Mich. Simple enough for an office boy to operate, the machine will produce up to 12x18-in. prints of drawings in 1 to 5 minutes—dry and ready for use. The developer consists of a metal cylinder with ammonia container at the bottom. The top cap is removable for inserting prints to be developed. The finish is gunmetal wrinkle to match the printing machine, a loop lug providing for convenient wall hanging.

### PORTABLE ELECTRIC HAMMER

Black & Decker Mfg. Co., Towson, Md., has redesigned its No. 34 portable electric hammer to increase the motor power and efficiency, thus providing faster drilling ability and increasing the life of the moving parts. This tool is a completely self-contained unit powered by a universal motor and requires no transformer, rectifier or other equipment. Its operating principle is based on the action being developed by an oscillating weight and spring assembly, the weight driven indirectly by a crank. The motor is mounted at right angles to the barrel and operates through a train of reducing gears. The action is characterized by a definite follow-through stroke, producing, according to the company, a high rate of efficiency. The tool weighs only 17 lb., develops 2,300 blows per minute and has a capacity in concrete or brick of $1\frac{1}{8}$ in.

### IDLER PULLEY

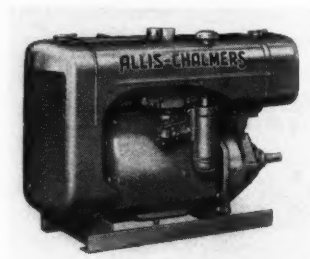
A light idler pulley said by the manufacturer to possess economical, high-speed and free-running qualities has been developed by SKF Industries, Inc., Philadelphia, Pa. A ball- and roller-bearing unit, it consists of a well-balanced standard or special pulley, 1 (see illustration), which is provided with a dustproof protective cover, 2, to form an effective seal. This seal eliminates all types of abrasive dust from the relatively heavy-duty roller bearing, 3, and the stabilizing ball bearing, 4. These special bearings run directly on a through-hardened chrome-steel shaft, 5, which gives the unit a maximum capacity within its compact dimensions. The ball bearing acts as an outboard bearing and insures surface-to-surface contact between the rollers and the shaft at all times. In addition, this deep-




groove ball bearing carries thrust loads, permitting the assembly to operate equally well in either vertical or horizontal positions. A cup, 6, is provided so that a measured quantity of grease may be placed in it every second year. At the time of the unit's assembly in the factory, an adequate quantity of grease is placed in the large reservoir, 7, to last the initial two years' operation (approximately 10,000 operating hours). The ease with which the unit is mounted is shown at 8.

### GASOLINE POWER UNIT

A new Model "B-15" has been added by Allis-Chalmers Mfg. Co., Milwaukee, Wis., to its line of gasoline power units for industrial equipment requiring 15-18 continuous horsepower. This new unit consists of the engine used in the Model 15 tractor mounted on a substantial welded angle-iron base and complete with radiator, hood, removable louvered side plates, fuel tank, clutch, clutch housing and pulley shaft. The B-15 is a 4-cycle




4-cylinder engine with a bore of $3\frac{1}{2}$ in., stroke of $3\frac{1}{2}$ in. and 116 cu.in. displacement. It has removable cylinder liners, high-tension magneto ignition, a heavy-duty oil-bath air cleaner, oil and fuel filters, and other features designed to assure long life and economical operation. It measures 31 1/16 in. high, $17\frac{5}{8}$ in. wide and the length, including starting crank, is $52\frac{3}{4}$ in.

### UTILITY DRILL

A new 5/16-in. utility ball-bearing drill has been added to the line of Van Dorn Electric Tool Co., Towson, Md. According to the maker, it is a general-purpose tool for general repair and maintenance work. It has a no-load speed of 1,100 r.p.m. Its drilling capacity is 5/16 in. in steel and $\frac{5}{8}$ in. in hardwood. It carries splined gear mounting on spindle ball bearings throughout, and a universal motor of ample capacity for general drilling, carbon cleaning, and other service work.